

CALIFORNIA ENERGY COMMISSION

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TN 38381



DATE: November 13, 2006
TO: Interested Parties
FROM: Christopher Meyer, Compliance Project Manager

DOCKET 79-AFC-4C	
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**SUBJECT: Bottle Rock Geothermal Power Plant (79-AFC-4C)
Staff Analysis of Petition to Change the Ownership, Allow the Restart of Operation After Suspension, and Allow 11 Facility Design Changes**

On August 4, 2006, the California Energy Commission received a petition from the Bottle Rock Power Corporation to amend the Decision for the Bottle Rock Geothermal Power Project. The Energy Commission certified the 55 MW Department of Water Resources (DWR) Bottle Rock Geothermal Power Plant in 1980, and operations to produce electricity for the State Water Project commenced in 1985. In 1990, DWR determined to close the facility due to a lack of steam. In 1993, the Commission approved an amendment to the Decision that reduced the monitoring and reporting requirements in consideration of the plant's shutdown status.

In 2001, the Energy Commission approved the transfer of the power plant from DWR to the Bottle Rock Power Corporation (BRPC), the latter assuming the responsibilities and obligations imposed by the conditions of certification of the power plant, including those that apply to the current suspension of power plant operations. The associated steamfield remains under the jurisdiction of Lake County pursuant to Lake County Amended Use Permit 85-27. In May of 2005, the Energy Commission approved an amendment to the Decision that extended the environmental monitoring program during suspended operations.

BRPC has submitted a petition to change the ownership to Bottle Rock Power, LLC (BRP), amend the Decision to allow the restart of operation, and complete the following 11 design changes at the facility:

1. Install vacuum pumps to maintain vacuum in the condenser versus reliance upon steam injectors;
2. Install a distributive control system for the plant;
3. Add a new skim line in the Stretford H₂S abatement system;
4. Add a mercury vapor filter upstream of the Stretford H₂S abatement system;
5. Add air spargers to the oxidizer tanks in the Stretford H₂S abatement system;
6. Change the operation and design of the secondary H₂S abatement system;
7. Add a second main steam line isolation valve;
8. Install a variable speed, automating steam stacking system;
9. Install a new design in the steam washing system;
10. Add a steam sampling point downstream of the Burgess Manning main steam separator; and
11. Install exterior lighting abatement improvements.

Energy Commission staff reviewed the petition and assessed the impacts of this proposal on environmental quality, public health and safety. Staff proposes revisions to existing Air Quality, Biological Resources, Public Health, Water, Soils, Civil Engineering, Waste and Transmission Line Safety and Nuisance, and Safety Conditions of Certification; the reactivation of suspended Conditions of Certification; and administrative revisions to the Conditions of Certification in each technical area to replace outdated references to agency contacts or regulations, replace all references to "DWR" with "project owner", and replace "CEC" with "CEC CPM" for consistency with the Commission's current administrative format.

It is the Energy Commission staff's opinion that, with the implementation of revised conditions, the project will remain in compliance with applicable laws, ordinances, regulations, and standards and that the proposed modifications will not result in a significant adverse direct or cumulative impact to the environment (Title 20, California Code of Regulations, Section 1769).

The amendment petition has been posted on the Energy Commission's webpage at www.energy.ca.gov/sitingcases/bottlerock/index.html. Staff's analysis is attached for your information and review. Energy Commission staff intends to recommend approval of the petition at the December 13, 2006 Business Meeting of the Energy Commission. Staff's analysis and the Order (if the amendment is approved) also will be posted on the webpage. If you have comments on this proposed modification, please submit them to me at the address below prior to December 8, 2006:

Christopher Meyer
Compliance Project Manager
California Energy Commission
1516 9th Street, MS 2000
Sacramento, CA 95814

Comments may be submitted by fax to (916) 654-3882, or by e-mail to cmeyer@energy.state.ca.us. If you have any questions, please contact Christopher Meyer, Compliance Project Manager, at (916) 653-1639.

Attachment

California Energy Commission

**Bottle Rock Geothermal Power Project
(79-AFC-4C)**

**Petition to Change the Ownership, Allow the
Restart of Operation After Suspension, and Allow
11 Facility Design Changes**

Staff Analysis

November 13, 2006



**BOTTLE ROCK GEOTHERMAL POWER PROJECT (79-AFC-4C)
STAFF ANALYSIS**

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EXECUTIVE SUMMARY

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Energy Commission staff reviewed the petition and assessed the impacts of this proposal on environmental quality, public health and safety. Staff proposes revisions to existing Air Quality, Biological Resources, Public Health, Waste and Transmission Line Safety Conditions of Certification; the reactivation of suspended Conditions of Certification and administrative revisions to the Conditions of Certification in each technical area to replace all references to "DWR" with "project owner" for consistency with the Commission's current administrative format.

PUBLIC AND AGENCY COORDINATION

A publicly noticed workshop on air quality was held by the Lake County Air Quality Management District (LCAQMD) in the project area as part of the permit review and amendment process. Energy Commission Air Quality staff participated in the (LCAQMD) public workshop. The Energy Commission held a publicly noticed staff workshop and site visit to review air quality, water resources, biological resources, cultural resources, noise, visual resources, traffic and transportation and other issues at the plant site. These workshops have been highly productive and allowed staff to review how some of the proposed changes to the Energy Commission Decision have been designed to address previous noise issues.

In addition to these workshops, coordination has occurred with local, state and federal agencies that have an interest in the project. Particularly, Energy Commission staff has worked with the Department of Water Resources, Lake County Air Quality Management District and Lake County to identify and resolve issues of concern. In addition, Commission staff has coordinated the review and analysis of the petition with U.S. Fish and Wildlife Service, California Department of Fish and Game, and the interested residents of the community.

A series of publicly noticed workshops and hearings will be conducted on this document during July. Information gathered during these workshops and hearings will be used to prepare the Presiding Member's Proposed Decision (PMPD). Additionally, written comments on the SA will be included in the PMPD.

CONDITIONS OF CERTIFICATION

Although the original Compliance Monitoring Report for the DWR Bottle Rock Geothermal Project, containing the Conditions of Certification, was written in November of 1980, it was rewritten in February of 1983 and then revised in June of 1983. The Conditions of Certification were amended further by Energy Commission Orders in 1993 and 2005. As a result of these alterations, the ownership change, and the elapsed time since the project was in operation, staff recognized the need to provide a complete, accurate and up to date version of the Conditions of Certification for the Bottle Rock Project. To this end, administrative changes have been made to many of the Conditions of Certification to remove references to DWR, remove outdated language, or update the names of responsible parties.

Since the 1993 Energy Commission Order only suspended certain Conditions of Certification while the plant was not in operation, all suspended Conditions of Certification were first proposed for reactivation. Staff has proposed deleting some of these reactivated Conditions of Certification that are no longer appropriate.

The Conditions of Certification for Air Quality and Biological Resources required more extensive modifications and have been addressed individually in the Staff Analysis.

Changes to the other technical areas were minor and were addressed in the Administrative Change section. The Energy Commission technical staff reviewed the petition and worked with the Compliance Project Manager to provide detailed recommendations on the proposed administrative changes.

The following Conditions of Certification have been added: Public Health **2-10**, Solid Waste Management **11-7** and **11-8**; and Transmission Line Safety and Nuisance **13-8**.

The following Conditions of Certification have been deleted: Biological Resources **5-1.c**, **5-1.d**, **5-1.g**, and **5-1.h**; Soils **8-2** and **8-3**; and Solid Waste Management **11-3**.

The following Conditions of Certification have been modified: Air Quality **1-2** (along with attached AQMD permit conditions), **1-2**, **1-3**, **1-5**, **1-6**, and **1-8**; Biology **5-1.a**, **5-1.b**, **5-1.e**, **5-1.f**, **5-3.a** through **5-3.d**, **5-3.i**, and **5-3.j**; Public Health **2-2**, **2-3**, and **2-4**; Water Resources **6-1**, **6-4**, and **6-5**; Soils **8-1** and **8-4**; Civil Engineering **9-3**; Solid Waste Management **11-1**, **11-2**, **11-5**, and **11-6**; and Safety **12-9** and **12-10**.

The following Conditions of Certification have received only administrative changes in reference to the project owner or agency contact: Air Quality **1-1**, **1-4**, and **1-7**; Public Health **2-1** and **2-5** through **2-9**; Socioeconomics/Aesthetics **3-1** and **3-2**; Cultural Resources **4-1** through **4-4**; Geotechnical/Seismic Hazards **7-1**, **7-2**, and **7-3**; Civil Engineering **9-1**, **9-2**, **9-4**, and **9-5**; Structural Engineering **10-1** through **10-6**; Solid Waste Management **11-4**; Safety **12-1** through **12-7**; Transmission Line Safety and Nuisance **13-1** through **13-7**; and Noise **16-1**, **16-2** and **16-3**.

No changes were made to the following Conditions of Certification: Biology **5-3.h**; Cultural Resources **4-5**; Water Resources **6-2**, **6-3**, and **6-6**; and Safety **12-8**.

CONCLUSIONS AND RECOMMENDATIONS

The Staff Analysis is a document of the Energy Commission staff so, by its very nature, the conclusions and recommendations presented are considered staff's testimony. The final decision of the Energy Commissioners will be based on the evidence presented at upcoming hearing in December.

Each technical area assessment in the Staff Analysis includes a discussion of the project and the existing environmental setting; the project's conformance with laws, ordinances, regulations and standards (LORS); whether the facility can be restarted and operated safely and reliably; project specific and cumulative impacts; the environmental consequences of the project using the proposed mitigation measures; conclusions and recommendations; and any proposed changes to the conditions of certification under which the project should be restarted and operated, should it be approved.

In summary this Staff Analysis finds that:

- The project is in conformance with all Laws, Ordinances, Regulations and Standards (LORS).

- With the proposed changes to the conditions of certification included in the various technical areas, the project's restart and operation impacts can be mitigated to a level less than significant.
- The Lake County Air Quality Management District believes that the project currently complies with the appropriate rules and requirements of the District and, with the proposed changes to the Conditions of Certification, will not contribute to the degradation of the air quality in the Lake County Air Quality Management District.

**Bottle Rock Geothermal Power Project (79-AFC-4C)
 Petition to Change the Ownership, Allow the Restart of Operation After
 Suspension, and Allow 11 Facility Design Changes
 Air Quality Staff Analysis**

Prepared by Brewster Birdsall
 October 6, 2006

Setting

The Bottle Rock Geothermal Power Plant (BRPP) is located within Lake County, California within the jurisdiction of the Lake County Air Quality Management District (LCAQMD), formerly the Lake County Air Pollution Control District (LCAPCD). The facility is near the community of Cobb within approximately 350 acres known as the Francisco Lease. Historically, the nearest residence has been approximately 1,900 feet from the geothermal power plant.

The Lake County air basin experiences superior existing air quality when compared to much of California. As shown in **Table 1**, the area achieves a status of "attainment" with all National and State Ambient Air Quality Standards.

**Table 1
 Federal and State Attainment Status for Lake County Air Basin**

Pollutant	Federal Classification	State Classification
1-hour Ozone	---	Attainment
8-hour Ozone	Attainment	---
Particulate Matter (PM10)	Unclassified/Attainment	Attainment
Fine Particulate Matter (PM2.5)	Attainment	Attainment
Nitrogen Dioxide (NO2)	Unclassified/Attainment	Attainment
Carbon Monoxide (CO)	Attainment	Attainment
Sulfur Dioxide (SO2)	Unclassified/Attainment	Attainment
Hydrogen Sulfide (H2S)	---	Attainment

Source: CARB 2006 (<http://www.arb.ca.gov/desig/adm/adm.htm>).

Applicable Laws, Ordinances, Regulations, and Standards

LCAQMD Rules 600, 601, and 605 (Permits, Authority to Construct) – The New Source Review rules require new emission sources to first obtain an Authority to Construct before commencing construction, installation, or operation of a source. The Authority to Construct is normally valid for one year, at which time the source operator must obtain a Permit to Operate.

LCAQMD Rule 608 (Permits, Geothermal Power Plants) – Requires geothermal power plants to use the best available control technology and to limit continuous H2S emission rates to no more than five pounds per hour (5.0 lb/hr). Any proposed plant

must be at least one mile away from “populated areas” (an area of at least 10 dwellings established within a quarter-mile diameter area, as defined by the Lake County Zoning Ordinance).

LCAQMD Rule 609 (Permits, Geothermal Stacking Emissions) – Requires geothermal power plant operators and steam suppliers to develop a written plan to limit stacking emissions (geothermal steam release due to power plant or steam line failure, outage, startup, or curtailment). The conditions of the plan are to be incorporated in the Authority to Construct issued by the LCAQMD.

LCAQMD Rule 655 (Permits, Performance Plan) – Sets the minimum requirements for a protocol or performance plan established as a means of determining compliance with permitted emission limits.

The allowable risks caused by toxic air contaminants and hazardous air pollutants from stationary sources are limited by federal emission standards and the toxics “hot spots” and new source review rules. The **Public Health** section of this analysis addresses potential toxic air contaminant emissions, such as mercury and arsenic, with steam analysis and ambient air quality monitoring requirements (Conditions **2-4** and **2-7**).

Analysis

Existing Geothermal Power Plant and Air Permit History

The existing geothermal power plant facility consists of:

- One 55 MW geothermal turbine-generator (Fuji Electric),
- A condenser system (Ecol-Aire),
- A five-cell counter flow cooling tower,
- A Stretford system for hydrogen sulfide (H₂S) abatement, and
- A developed steam field.

The existing emission sources and environmental impacts were addressed by a 1980 Determination of Compliance (1980 DOC) and a 1982 Modified Determination of Compliance (1982 Modified DOC). These determinations originally issued by LCAPCD established the air permit conditions that are the basis of a 2005 LCAQMD renewal of the Authority to Construct (Permit # A/C 80-034A). Emissions from the upstream steam field were addressed in 1983, as part of a separate conditional use permit issued by Lake County Community Development Department (outside of Energy Commission jurisdiction).

Permitted emissions from the power plant include H₂S and various non-criteria pollutants. Additional sources at the Bottle Rock Power Plant include the cooling tower (source of PM₁₀ from drift) and a standby diesel engine generator set, which would emit products of combustion during periodic testing for reliability. **Table 2** shows the permitted H₂S limit and the estimated non-criteria pollutant emission rates.

**Table 2
Historic Expected Maximum Emissions from BRPP, prior to Proposed Project**

Pollutant	Expected Pollutants from Steam Input to Plant	Permit Limit	Expected Maximum Emissions
Hydrogen Sulfide (H ₂ S)	450 lb/hr	5 lb/hr	5 lb/hr
Boron	30 lb/hr	---	0.52 lb/hr
Fluoride	0.445 lb/hr	---	0.008 lb/hr
Arsenic	0.1 lb/hr	---	0.002 lb/hr
Silica	41 lb/hr	---	0.70 lb/hr
Ammonia (NH ₃)	140 lb/hr	---	100 to 140 lb/hr
Mercury (Hg)	0.02 lb/hr	---	< 0.02 lb/hr
Radon	3.6 millicuries/hr	---	3.6 millicuries/hr

Source: LCAPCD 1982 Modified DOC.

The original 1980 DOC addressed the ambient air quality impacts of the Bottle Rock Power Plant and compliance of the original design with New Source Review regulations. That analysis found that although occasional violations of the 30 ppb California Ambient Air Quality Standard for H₂S occurred historically, the Bottle Rock Power Plant project emitting 5 lb/hr H₂S would cause a maximum impact of approximately 10 ppb, which would not substantially cause or contribute to violations of the standard. The 1980 DOC determined that the project as conditioned would be likely to comply with applicable rules and regulations, including Rules 600 and 605 related to New Source Review.

Proposed Modifications

The proposed modifications prior to re-firing and renewed operation include:

- Addition of mechanical vacuum pumps to augment the steam off-gas ejectors upstream of the gas scrubbing unit,
- Improvements to the gas scrubbing unit for H₂S removal and conversion to elemental sulfur,
- Addition of a carbon scrub system to remove mercury from the non-condensable gas,
- Changing the operation of the secondary condensate treatment system,
- Installing a modern control system,
- Installing a new design of steam washing (desuperheating) system for debris removal, and
- Modifying the emergency steam stacking abatement system.

The LCAQMD completed its Permitting Review for Bottle Rock Power Plant modernization, modification, and re-start on August 30, 2006. The Permitting Review provides new permit conditions for the new equipment and minor amendment of the

conditions in the 1982 Modified DOC. The proposed modifications and amended permit conditions are described below. No increase in the emissions identified in the 1982 Modified DOC, shown in **Table 2** above, is expected to occur with the proposed modifications.

Table 3 shows the conditional approvals issued by LCAQMD on September 1, 2006 for the proposed modifications.

Table 3
Summary of Conditional Approvals Issued for Proposed Modifications to BRPP

Authority to Construct	Description
A/C 2006-20	Mechanical Liquid Seal Ring Vacuum Pump Addition
A/C 2006-21	Stretford Process Equipment Modifications
A/C 2006-22	Sulfur Cake Process, Spare Vacuum Filter Addition
A/C 2006-23	Mercury Scrubber Addition
A/C 2006-24	Condensate H ₂ S Abatement System Modifications
A/C 2006-25	Automated Supervisory Control System Modifications
A/C 2006-26	Steam Transmission Line Modifications

Source: LCAQMD 2006a.

The basic operations of the plant would continue upon re-firing generally as previously permitted. Geothermal steam would be delivered to the power plant steam turbine to generate electricity. The low-pressure non-condensable gas at the outlet of the steam turbine would be separated from liquid condensate at the surface condenser. The non-condensable gas (sour gas, laden with H₂S) would be treated for H₂S removal by the primary H₂S abatement system (a Stretford unit). Secondary H₂S abatement would occur by treating the liquid condensate with pH adjustment, hydrogen peroxide (H₂O₂), and iron chelate catalyst. No notable change to the cooling tower or standby diesel engine-generator set is proposed.

The proposed changes upstream of the primary H₂S abatement system include adding electric mechanical vacuum pumps into the surface condenser as an alternative to the existing steam-driven off-gas ejector system. This would improve plant reliability and improve control of steam turbine by-pass to the condenser and into the primary H₂S abatement system during generator outages (as in **DOC-2**, **DOC-6**, and **DOC-12**). This should also reduce the need to directly vent non-condensable gas during cold startups by improving gas flow to the primary H₂S abatement system. Additionally, an activated carbon, sulfur-impregnated proprietary mercury absorption unit would be added to reduce the mercury vapor content of the sour non-condensable gas. LCAQMD expects this device to reduce mercury emissions by 99+ percent when compared to those identified in the 1982 Modified DOC (**Table 2**) or to below 0.2 lb/yr and 0.0002 lb/hr (LCAQMD 2006a).

Proposed changes to the primary H₂S abatement system (the Stretford unit) include adding piping changes to improve catalyst contact, sulfur solids removal, and

redundancy of systems. A backup vacuum drum filter for sulfur cake processing would be added.

The proposed modifications for the liquid-phase secondary H₂S abatement system would minimize the use of hydrogen peroxide (H₂O₂) by adjusting piping and using a specific proprietary iron salt catalyst that has been recently used at other geothermal power plants in the area.

Proposed control system modernizations would improve the tracking of plant operations (required by **DOC-7**), prevent outages, and avoid the need for emergency stacking, which can occur during a dual outage of the plant and primary H₂S abatement system.

Although the need for steam stacking should be reduced with the above changes, this emergency secondary H₂S abatement system would also be refurbished. The existing emergency steam stacking system sequentially adds water, sodium hydroxide and hydrogen peroxide before venting to a graded-rock-filled muffler enclosure. This system would remain available and would include modified pump controls to improve the precision of chemical treatment. As required by LCAQMD Rule 609, stacking emissions would be addressed by a written operating procedure approved by LCAQMD (as in **DOC-23**).

Various monitoring requirements from the 1982 Modified DOC would be carried forward and would be applicable to the new operations. Monitoring of emissions would continue to be required with continuous emissions monitors for H₂S (**DOC-15**, **DOC-20**, **DOC-22**), and ambient air quality monitoring must occur if off-site concentrations of H₂S create a nuisance (**DOC-18**). Emissions of other air contaminants present in the steam (e.g., arsenic, mercury, radon-222) must be monitored for one year after beginning commercial operation (**DOC-22**).

This analysis recommends expanding **Condition 1-2** to ensure that LCAQMD conditions that were originally related to initial commercial operation (i.e., **DOC-16** [file an application for a Permit to Operate] and **DOC-22** [conduct ambient air pollutant monitoring]) apply to the commencement of re-firing and renewed operation.

This analysis summarizes the proposed modifications to the Bottle Rock Power Plant and shows that plant reliability would likely be improved and emissions would likely be less than or equal to those previously permitted, which would not cause or contribute to a violation of ambient air quality standards and would be likely to comply with applicable laws, ordinances, regulations, and standards.

The Petition to Amend identified the project owner's proposed changes to Energy Commission Conditions of Certification. All of the recommended changes are acceptable to staff and have been incorporated in the revisions below.

Conclusions and Recommendations

Staff concludes that the Bottle Rock Geothermal Power Plant can comply with all state, federal, and local laws, ordinances, regulations, and standards, if staff's proposed mitigation and monitoring requirements are fully implemented.

Staff recommends adoption of the proposed conditions with approval of the petition to amend the final decision for the Bottle Rock Power Plant.

Mitigation Measures and Conditions

The following proposed revisions to the Conditions of Certification of the Bottle Rock Geothermal Power Project will reactivate the conditions from the Energy Commission's 1983 Compliance Monitoring Report with appropriate amendments to re-fire the plant. Amendments also replace outdated references to the former project owner, California Department of Water Resources (DWR) with the term "project owner," and "CEC staff" with "CEC CPM" to reflect current administrative terminology. Deleted text is in strikethrough and new text is double underlined.

Reactivated and Continued Conditions

The original Conditions of Certification 1-1 through 1-6 suspended by 1993 Energy Commission Order (93-0426-02) should be reactivated with the modifications needed to allow restarting operation of the plant with the proposed equipment modifications. Conditions of Certification 1-7 and 1-8 remain in force and have been modified to address the restart of operation. Except for "**Verification**" below, deleted text from the 1993 Order is shown in ~~strikethrough~~ and added text from the 1993 Order is underlined. Staff proposed reactivation of the Conditions of Certification is shown in plain text. New deleted text is shown as ~~double strikethrough~~ and new added text is shown as double underline.

- 1-1 The ~~LCAPCD~~ LCAQMD shall perform all duties and functions normally conducted by the APCD District and shall have authority to issue a Permit to Operate, collect the permit fees, levy fines, order correction of operational or mechanical procedures or functions, and perform compliance tests. The established ~~LCAPCD~~ LCAQMD appeal procedures shall apply for all contested ~~LCAPCD~~ LCAQMD actions.

Verification: ~~DWR~~ The project owner shall summarize in an annual compliance report any interactions with the ~~LCAPCD~~ LCAQMD. ~~DWR~~ The project owner shall immediately inform the CEC CPM and ARB in writing of any formal appeals filed with the ~~LCAPCD~~ LCAQMD.

1-2 ~~DWR~~ The project owner shall comply with the requirements specified in the ~~Lake County Air Pollution Control District document entitled, "Modified Determination of Compliance,"~~ dated February 22, 1982, with modifications in the LCAQMD Authority to Construct for the Bottle Rock Power Plant (Permit # 80-034A) as amended and with the conditions of the Authorities to Construct listed below ~~CEC Decision on DWR's Petition.~~ The project owner shall comply with the LCAQMD requirements for initiating commercial operation upon commencing renewed commercial operation of the Bottle Rock Power Plant.

- A/C 2006-20 Mechanical Liquid Seal Ring Vacuum Pump Addition
- A/C 2006-21 Stretford Process Equipment Modifications
- A/C 2006-22 Sulfur Cake Process, Spare Vacuum Filter Addition
- A/C 2006-23 Mercury Scrubber Addition
- A/C 2006-24 Condensate H2S Abatement System Modifications
- A/C 2006-25 Automated Supervisory Control System Modifications
- A/C 2006-26 Steam Transmission Line Modifications

Verification: ~~DWR~~ The project owner shall annually request a letter from the ~~Lake County Air Pollution Control District~~ LCAQMD verifying the status of ~~DWR's~~ the project owner's compliance with the conditions of the ~~modified Determination of Compliance~~ each Authority to Construct and the modified Determination of Compliance. ~~DWR~~ The project owner shall provide the CEC CPM with a copy of this letter in the annual compliance report. In addition, ~~DWR~~ the project owner shall provide ~~the CEC with~~ a copy of all quarterly reports and testing/monitoring summary reports submitted to the ~~LCAPCD~~ LCAQMD.

Reactivate the following conditions from the 1982 Modified Determination of Compliance with edits specified in the 2006 LCAQMD Authority to Construct 80-034A and 2006 LCAQMD Permitting Review for Bottle Rock Power Plant modernization, modification, and restarting of operation.

District Permit # A/C 80-034A, Modified Determination of Compliance

DOC-1 Hydrogen sulfide (H₂S) emissions from the Bottle Rock Power Plant (BRPP) shall be limited to a maximum of five (5) pounds per hour during power plant generation and all possible generation outages. All untreated steam or condensate shall be returned to a treatment or re-injection point to ensure this level of emissions is maintained.

DOC-2 The atmospheric emissions control system (AECS) described in the AFC and revision to the AFC, April 18, 1980, shall be utilized. The system as described, which constitutes the best available control technology, shall consist of the following concurrently available major components:

- a) A surface condenser to facilitate the partitioning of H₂S into the non

condensable gas phase;

b) A Stretford unit as specified in the AFC to reduce the H₂S concentration in the non condensable gases to 10 parts per million by volume (ppmv) or less;

c) Secondary condensate treatment which includes sufficient hydrogen peroxide (H₂O₂) and catalyst injection and reaction time to ensure the power plant will comply with the emission limitation specified in Condition DOC-1;

d) A turbine by-pass system sufficiently sized to accept 100 percent of full steam flow during generating outages so that the power plant emission control system can be utilized to treat steam normally stacked during the outage. ~~In addition,~~

e) The air emissions control system specified above shall be properly winterized.

f) If a solids removal system is necessary as a result of solids formation in the condensate, such facility shall be incorporated into the system.

g) In the event of Bottle Rock generation loss, an alternate source of power to enable the continued use of the air emissions control system specified above shall be available.

h) A stand by generator capable of sustaining station power and the MGR's Emergency Stacking System shall be available and fueled with low sulfur fuel of 0.5 percent or less for use in case of concurrent transmission line and generator failure.

DOC-3 The major components of the air emissions control system, Stretford, Turbine by-pass, and condensate abatement shall incorporate a design to enable a 99 percent availability excluding scheduled maintenance on these individual major components. If such design criteria cannot be established, abatement systems shall be retrofitted as necessary to achieve performance at this level.

DOC-4 Upon failure of H₂S abatement equipment, ~~DWR~~ the project owner shall curtail to a level necessary to comply with the five (5) lbs/hr H₂S emissions limitation or provide for a mechanism allowing an immediate determination of prevailing atmospheric conditions to enable the LCAPCO to make a decision as to whether it is acceptable to continue operation at a higher emissions level.

DOC-5 The cooling tower shall have a guaranteed drift rate of no more than 0.00002 as described in the AFC.

DOC-6 The off-gas vent to the atmosphere shall be used only during legitimate emergencies and to enable the cold start-up of the power plant turbine. Steam flows shall not exceed 25,000 lbs/hr to the power plant during direct venting of untreated non condensable gases in the steam. The turbine by-pass shall be used if possible to avoid direct venting into the atmosphere of undiluted non-condensables. The ~~LCAPCD~~ LCAQMD shall be notified when cold start-ups in excess of 5 lbs H₂S/hr are to occur and may cancel such activity if deemed necessary.

DOC-7 ~~DWR~~ The project owner shall install alarms and switches on the following units to ensure immediate corrective action is initiated to prevent outages and potential stacking. Alarm/trip conditions noted with an asterisk have a separate alert and trip alarm function and those alarm/trip conditions without an asterisk are coincident alarm/trip functions:

Turbine Generator Unit -

1. ~~Excessive~~ Excessive vibration switch, alarm and trip;
2. Lateral motion switch on the turbine shaft, alarm and trip;
- 3.* High lube oil temperature switch, alarm and trip;
- 4.* Low lube oil pressure switch with indicating light in control room;
- 5.* Low lube oil sump level switch, alarm;
6. Over-speed switch, alarm and trip;
- 7.* High hydrogen gas temperature and low purity hydrogen alarm and trip;
- 8.* Seal oil level switch and alarm;
- 9.* Differential pressure switch to prevent low differential pressure between the seal oil and hydrogen pressure, alarm and trip;
- 10.* Generator moisture detector and alarm;
- 11.* Vacuum switch to prevent low vacuum in the seal oil detaining tank, alarm and trip;
- 12.* Turbine bearing metal temperature alarm and trip.

Condensers -

- 1.* Pressure switch to prevent condenser pressures from exceeding design levels, alarm and trip;
- 2.* Condensate level switches to start and stop pump, prevent excessively high condensate levels in hot well;
- 3.* High or low condensate levels alarms.

Cooling Towers -

- 1.* Float switches and indicators to start and stop the pump in the cooling tower overflow basin and provide alarms;
2. Vibration switches and alarms on each cooling tower fan.

Electrical System -

1. Generator differential current trip and alarm;

2. Generator over-current trip and alarm;
3. Generator ground fault trip and alarm;
4. Generator anti-motoring trip and alarm;
5. Generator field ground trip and alarm;
- 6.* Generator stator over temperature alarm and trip;
7. Loss of excitation trip and alarm;
8. System negative phase sequence trip and alarm;
9. Transformer differential current trip and alarm;
10. Transformer over-current trip and alarm;
11. Transformer ground fault trip and alarm;
12. Transformer sudden pressure trip and alarm;
- 13.* Transformer winding temperature alarm;
- 14.* Transformer oil temperature alarm.

DOC-8 The ~~LCAPCD~~ LCAQMD shall be notified within one hour following any power plant outage or malfunction resulting in emissions in excess of five (5) pounds per hour H₂S at ~~(707) 263-2391, 263-3121~~ (707) 263-7000, 263-3225, or a number to be provided by the ~~LCAPCD~~ LCAQMD. ~~DWR~~ The project owner shall maintain a log of power plant outages along with explanations for the outages and malfunctions. In the event that power plant outages recur because of equipment malfunctions that are not indicated by alarms, ~~DWR~~ the project owner shall retrofit alarms on the malfunctioning equipment as possible. The log shall be available for inspection upon the request of the staffs of the ~~LCAPCD~~ LCAQMD, ARB, CEC, and EPA.

DOC-9 The power plant abatement system shall have an operator on site at all times. The operator must be able to immediately take necessary corrective action in the event of power plant outage or equipment malfunction in order to meet the conditions of this Determination of Compliance. ~~DWR~~ The project owner shall provide a telephone number at which the Bottle Rock operator or a representative can be reached to ensure ~~LCAPCD~~ LCAQMD entry for inspection purposes within one (1) hour of notification. If for considerations of safety, ~~DWR~~ the project owner cannot comply with such a specific request, ~~DWR~~ the project owner shall forward in writing within one week a letter explaining the reasons entry within one hour could not be allowed the ~~LCAPCD~~ LCAQMD staff.

DOC-10 ~~DWR~~ The project owner's approved-for-construction drawings or other drawings acceptable to the LCAPCO of the Stretford unit, turbine bypass, and secondary abatement (condensate treatment) system shall be submitted to the ~~LCAPCD~~ LCAQMD and CEC for comment and review at the earliest possible date and in time for such drawings to be commented upon and modified if necessary. ~~DWR~~ The project owner shall not be required to submit proprietary information unless specifically requested by the LCAPCO pursuant to Section 91010, Title 17, California Administrative Code.

- DOC-11** ~~DWR~~ The project owner shall submit to the ~~LCAPCD~~ LCAQMD, ARB, and CEC the results of the pilot test program performed by Bechtel National, Inc., no later than February 1, 1982, or within one month before the finishing of final design of the hydrogen peroxide/catalyst abatement system.
- DOC-12** Although the applicant is to be licensed upon the use of BACT as described in Condition DOC-2, ~~DWR~~ the project owner may use other means to comply provided the ~~LCAPCD~~ LCAQMD, ARB and CEC are provided performance data indicating the other means are capable of achieving the same emissions limitations and reliability as those defined in Condition DOC-2. Any such changes shall be decided at a properly noticed public hearing to be convened jointly by the ~~LCAPCD~~ LCAQMD and CEC, no later than two years prior to anticipated power plant operation at which the ARB and all intervenors shall be invited to participate. The ~~LCAPCD~~ LCAQMD concurrence upon any changes must be given.
- DOC-13** The access road from Bottle Rock Road to the power plant shall be paved to ensure that the generation of fugitive particulate matter is minimized.
- DOC-14** Within sixty (60) days after initial power production, ~~DWR~~ the project owner shall demonstrate that the applicable emissions limitations are being maintained during normal power plant operations. ~~DWR~~ The project owner shall submit a detailed performance test plan to the ~~LCAPCD~~ LCAQMD at least thirty (30) days prior to such tests. Such plans shall also be designed to determine the particulate emissions rate and components of particulate emitted. ~~DWR~~ The project owner's proposed test plan must receive ~~LCAPCD~~ LCAQMD and CEC staff approval before such tests may be conducted to determine compliance.
- The ARB shall arbitrate difference if concurrence on a test procedure can not be reached between CEC, the project owner and the LCAQMD and recommend a binding procedure. Safe sampling access and ports to enable the ~~LCAPCD~~ LCAQMD to gather samples from the freshly treated condensate, cooling tower stack and treated gas from the Stretford system shall be provided.
- DOC-15** Reports shall be issued quarterly to the ~~LCAPCD~~ LCAQMD detailing: a) hours of operation, b) any periods for which abatement equipment malfunctioned and the action taken; c) chemicals utilized for treatment of condensate; d) periods of scheduled and unscheduled outages and the reasons for such outages; and e) summary of the output of continuous emissions monitors with explanations of any irregularities.

- DOC-16** Within ninety (90) days after commercial operation ~~DWR~~ the project owner shall file with the ~~LCAPCD~~ LCAQMD an application for a Permit to Operate together with all appropriate information to ensure compliance with the certification and submit permit fees.
- DOC-17** ~~DWR~~ The project owner shall take all reasonable measures to comply with ~~a~~ any future air emittent or ambient standard or guideline adopted for present non criteria pollutants (i.e., mercury, boron, arsenic, radon-222, etc.) by responsible State or Federal agencies and/or comply with guidelines established as part of ~~DWR~~ the project owner's certification by the California Energy Commission.
- DOC-18** ~~DWR~~ The project owner shall promptly fund reasonable studies or tests as required by the LCAPCO to ascertain the impact of ~~DWR~~ Bottle Rock BRPP when operating, specifically at the residence located approximately 1,900 ft east of the Francisco pad, should the resident in good faith file complaints with the LCAPCO indicating the air quality is worsening or becoming a nuisance or unhealthful as a result of Bottle Rock's operation. These studies shall include, but not be limited to, monitoring at the residence to determine H₂S levels and particulate or other components which are believed or known to be in geothermal steam, tracer tests or source tests. Such studies shall be approved by the LCAPCO prior to initiation. Reasonable mitigation steps shall be applied upon request of the LCAPCO to attempt to remedy any unlawful impacts caused by the Bottle Rock power plant upon the residence.
- DOC-19** The incoming steam to the power plant shall be analyzed quarterly and reported to the CEC and ~~LCAPCD~~ LCAQMD for radon-222 and its daughters, mercury, arsenic, silica, boron, benzene, ammonia, and total suspended solids for the first two years of operation. The results of these tests shall be reviewed by the LCAPCO to determine if thereafter annual testing will suffice. ~~DWR~~ The project owner may join with the steam supplier in performing such tests. Results of any tests performed upon the cooling tower sludge shall also be forwarded to the ~~LCAPCD~~ LCAQMD.
- DOC-20** H₂S emissions shall be monitored continuously by measuring total volume flow rates and H₂S concentrations at the following locations: a) incoming steam; b) outlet of the Stretford unit; and c) in the treated condensate. A log of such monitoring shall be maintained and be made available to ~~LCAPCD~~ LCAQMD staff upon request. The devices must have accuracies of +1 ppm, provide measurements at least every 15 minutes, and be accessible to ~~LCAPCD~~ LCAQMD staff. Flow rate measuring devices must have accuracies of +5 percent at 40 to 100 percent of the total flow rate and calibrations must be performed at least quarterly. Calibration records must be made available to ~~LCAPCD~~ LCAQMD staff upon request. Monitoring shall be required

pursuant to Section 42303 of the California Health and Safety Code.

In the event that acceptable continuous monitors are not available, ~~DWR~~ The project owner shall conduct testing no less than once every thirty (30) days to ensure the efficiencies of the H₂S abatement systems are being maintained. The testing procedure used to determine compliance must be approved by the LCAPCO. A log of such testing shall be maintained and be available to ~~LCAPCD~~ LCAQMD staff upon request. The ~~applicant~~ project owner shall on an annual basis after the date of the decision submit for approval by the ~~LCAPCD~~ LCAQMD, CEC and ARB a summary of the ~~applicant's~~ project owner's efforts to develop, research, let for contract to research, or let for contract to implement use of equipment, that is to be a likely candidate for a continuous condensate and non condensable gas monitor for hydrogen sulfide.

In either case, a summary of the monitoring and/or testing shall be forwarded to the ~~LCAPCD~~ LCAQMD every three (3) months.

DOC-21 ~~DWR~~ The project owner shall, at the request of the APCO, install, operate and maintain an on-site meteorological station capable of determining wind direction, wind speed, standard deviation of the direction, and temperature. Such data shall be furnished to the ~~LCAPCD~~ LCAQMD on a monthly basis in an hourly/day format and quarterly in a summary format acceptable to the APCO.

DOC-22 Compliance monitoring shall be conducted for a minimum one (1) year period before initial operation and one (1) year period after initial operation. Constituents to be monitored include arsenic, boron, mercury, radon-222, benzene, silica, and particulates in addition to H₂S. Constituents shall be measured both as suspended aerosols and fall-out. Monthly composite samples of fall-out shall be collected using a wet/dry collector. Constituents other than H₂S may be measured every sixth day, per the ARB particulate sampling schedule. ~~DWR~~ The project owner, CEC, and ~~LCAPCD~~ LCAQMD shall agree upon methods used in sampling and analysis. At the end of the indicated period, the monitoring program will be reviewed by the APCO and the feasibility and necessity for continuance determined. The site for such monitoring shall be in the Cobb Valley area unless ~~DWR~~ the project owner and the ~~LCAPCD~~ LCAQMD agree upon a mutually acceptable alternative site.

If ~~DWR~~ the project owner enters into a combined effort with other developers or an alternative monitoring program acceptable to the ~~LCAPCD~~ LCAQMD and CEC, this condition shall not be exercised.

DOC-23 Added condition resulting from ~~modification~~ 1982 Modified Determination of Compliance.

A) Regarding secondary abatement:

~~LCAPCD LCAQMD~~ shall incorporate into the Bottle Rock Power Plant construction the ability to control the pH of treated condensate, provide for the oxidation of H₂S utilizing H₂O₂, ensure a residence time of 75 or more seconds, and incorporate the ability to add on a catalyst injection capability to the secondary system should operating experience show such is necessary. Chemical storage capacity shall be as specified in the AFC amendments and no less than one weeks supply shall remain on-site at all times.

Alternatively, ~~DWR~~ the project owner can provide information acceptable to the ~~LCAPCD LCAQMD~~ and ARB establishing pH adjustment and control is not necessary at the Bottle Rock Power Plant or provide temporary facilities (portable) for the injection of NaOH during power plant start-ups until the question of pH control can be resolved.

Required Future Reports & Documents:

~~DWR~~ The project owner shall forward the Bechtel H₂S Oxidation Study final report immediately upon its being finalized. And, no less than two months prior to initiating construction of the condensate abatement system, a detail design of the condensate abatement system shall be submitted formally in writing to the ~~LCAPCD LCAQMD~~ to enable ~~the LCAPCD to establish DWR's~~ compliance with these DOC requirements to be established by the ~~LCAPCD LCAQMD~~.

B) Regarding the turbine by-pass to power plant main condenser system:

~~DWR~~ The project owner shall incorporate reliable and proven valves, noise attenuation of the valving, and desuperheating of by-passed steam/or account for in the design of the system, the ability to successfully by-pass 100 percent of the steam load.

Required Future Reports & Documents:

~~DWR~~ The project owner shall submit to the ~~LCAPCD LCAQMD~~ within 60 days of ~~CEC approval of the modified AECS~~, a report detailing at a minimum:

(1) The selection of the turbine by-pass valves, the operating experience with the selected valves, and the specific reason the valve design selected was chosen. To the extent possible, this report shall address the material presented in the Gibbs & Hill report on the subject.

(2) The design features incorporated and/or operating experience to ensure that the absence of desuperheating ability will not adversely affect the operation of the turbine by-pass or power plant emissions control system.

~~DWR~~ The project owner shall within sixty days prior to installation of the by-pass system provide detailed engineering drawings and a description in writing of the operation procedure for the turbine by-pass to power plant condenser system. The design shall incorporate the ability to by-pass during start-up and partial curtailment as well as total turbine failure.

~~DWR~~ The project owner, prior to operation of Bottle Rock shall with the steam supplier enter into an agreement detailing the responsibilities for operations of the turbine by-pass and emergency stacking abatement systems. Also, the interface between the stacking system controls shall be delineated by the steam supplier and ~~DWR~~ the project owner and approved by the ~~LCAPGD~~ LCAQMD. A copy of the agreement shall be filed with the ~~LCAPGD~~ LCAQMD no less than 60 days prior to initial power plant operation.

District Permit # A/C 2006-20, Mechanical Liquid Seal Ring Vacuum Pump Addition

AC20-1 This Authority to Construct is to modify the existing non-condensable gas removal system, air emissions control system (AECS), and to blind flange the auxiliary steam non-condensable gas vent; all other permits, associated conditions, and limitations are not modified. The permitted modification is described in the application for modification and evaluated in the analysis accompanying this permit issuance. Equipment utilized and/or modified which is significantly different than that described in the permit application is subject to permit application and review. A permit to operate application shall be made within one year of initial operation, and the subject permit shall be incorporated into the general permit for the power plant.

AC20-2 The gas ejectors shall remain operable and available for use in the event of failure of the mechanical vacuum pump.

AC20-3 All drain or discharge seal water shall be directed to the rich condensate collection and disposal system.

AC20-4 This permit does not modify or make less restrictive any emission limitation, reporting, and/or monitoring/testing requirements that presently exist for this facility.

AC20-5 The applicant shall provide the District, no less than 30 days subsequent to the installation and operation of the herein authorized modification, with as-built drawings for the modification, including Non-Condensable line(s) and AECS showing gas flow, and rich condensate collection and disposal method (reinjection or reflashing in the condenser).

AC20-6 The operator shall provide safe access for representatives of the District, ARB, or EPA to inspect, review records, or collect samples as approved by the APCO, from this facility. Should the plant be secured by locks or gates, the District shall be provided keys, combinations of other means to gain immediate access for purpose of testing or inspection.

District Permit # A/C 2006-21, Stretford Process Equipment Modifications

AC21-1 This Authority to Construct is for the addition of a 10 inch diameter skimming pipe on the Delay Tank between the existing 6 inch skimming lines, the addition of two (2) Oxidizer Tank air spargers operated by the air blowers, and all necessary piping and valves at the Bottle Rock Power Plant Stretford H₂S Treatment system; all other permits, associated conditions, and limitations are not modified, except as explicitly approved. The permitted modification is described in the application for modification and evaluated in the analysis accompanying this permit issuance. Equipment utilized and/or modified which is significantly different than that described in the permit application is subject to permit application and review. A permit to operate application shall be made within one year of initial operation, and the subject permit shall be incorporated into the general permit for the power plant. The installation and operation of the modification shall not hinder the operation of the existing plant systems or inhibit emission limit compliance, as operated under A/C 80-034A.

AC21-2 The ability to return the H₂S gas treatment components of the AECS operation to the pre-modification operation shall be retained. BRPC shall notify the District upon completion of tile modifications to arrange for an inspection.

AC21-3 Within ~~sixty~~ (30) days after the installation of the skimming lines and air sparging head are completed and operational, the permit holder shall submit a set of "as built" drawing(s) detailing the Stretford/Peabody H₂S abatement system.

AC21-4 This permit does not modify or make less restrictive any emission limitation, reporting, and/or monitoring/testing requirements that that presently exist for this facility.

AC21-5 The operator shall provide safe access for representatives of the District, ARB, or EPA to inspect, review records, or collect samples as approved by the APCO, from this facility. Should the plant be secured by locks or gates, the District shall be provided keys, combinations or other means to gain immediate access for purpose of testing or inspection.

District Permit # A/C 2006-22, Sulfur Cake Process, Spare Vacuum Filter Addition

AC22-1 This Authority to Construct is for the addition of a second rotating vacuum drum (Bird Filter) for optional use, and removal of a sulfur melter; all other permits, associated conditions, and limitations are not modified herein. The permitted modification is described in the application for modification and evaluated in the analysis accompanying this permit issuance. Equipment utilized and/or modified which is significantly different than that described in the permit application is subject to permit application and review. A permit to operate application shall be made within one year of operation, and the permit to operate may be incorporated into the general permit for the power plant.

AC22-2 The applicant shall provide the District, no less than 30 days subsequent to installation of the herein authorized modification, with as-built drawings for the modification.

AC22-3 This permit does not modify or make less restrictive any emission limitation, reporting, and/or monitoring/testing requirements that presently exist for this facility.

AC22-4 The operator shall provide safe access for representatives of the District, ARB, or EPA to inspect, review records, or collect samples as approved by the APCO, from this facility. Should the plant be secured by locks or gates, the District shall be provided keys, combinations or other means to gain immediate access for purpose of testing or inspection.

District Permit # A/C 2006-23, Mercury Scrubber Addition

AC23-1 This Authority to Construct is for the installation of up to two mercury scrubber vessels and necessary modifications to the existing non-condensable H₂S gas treatment system at the Bottle Rock Power Plant to be inserted downstream of the water knockout and upstream of the delay tank. The permitted modification is described in the application for modification and evaluated in the analysis accompanying this permit issuance. Equipment utilized and/or modified which is significantly different than that described in the permit application is subject to permit application and review. A permit to operate application shall be made within one year of initial operation of installed components.

and the subject permit shall be incorporated into the general permit for the power plant. If the second scrubber unit is not yet installed after one year, the A/C may be renewed.

AC23-2 BRPC shall install and maintain sampling ports on the influent and effluent sides for each mercury scrubber and measure and report measured efficiency of mercury scrubbing to the AQMD upon reaching 20 megawatts of generation, but no later than within the first year of initial operation. A log shall be maintained of unit maintenance to include dates of media changes and the reason for change out, any events of plugging, and all coincident mercury measurements made in sulfur product. The log shall be forwarded quarterly to the AQMD, or provided upon request.

AC23-3 All drain water discharged shall be directed to the rich condensate collection line.

AC23-4 Equipment shall be operated within supplier/manufacturers specifications. A local gauge indicating pressure drop across the unit shall be incorporated into the installation. Additionally, BRPC shall continuously monitor the scrubbers for pressure loss utilizing the DCS measurements prior to the delay tank and on the backside of the mechanical pumps, and incorporate alert and maintenance action warning levels prior to generation unit trip due to overpressure or back pressure of scrubbing media.

AC23-5 BRPC shall notify the District upon completion of installation of the mercury scrubber(s) to arrange for an inspection, and enable source testing to be performed.

AC23-6 This permit does not modify or make less restrictive any emission limitation, reporting, and/or monitoring/testing requirements that presently exist for this facility.

AC23-7 BRPC shall provide the District, no less than 60 days subsequent to installation of the herein authorized modification, with as-built drawings for the modification, including sample port locations.

District Permit # A/C 2006-24, Condensate H₂S Abatement System Modifications

AC24-1 This permit is for refinements to the existing condensate piping and valving servicing the Bottle Rock Geothermal Power Plant and permanent addition of the iron chelate chemical injection system; all other permits, associated conditions, and limitations are not modified herein. The permitted modification is described in the application for modification and evaluated in the analysis accompanying this permit issuance. Equipment utilized and/or modified which is significantly

different than that described in the permit application is subject to permit application and review. A permit to operate application, containing operating scenarios and contingency actions, shall be made within one year of initial operation, and the permit to operate may be incorporated into the general permit for the power plant. A performance plan consistent with rule 655 is recommended. The condensate reroute and iron chelate addition modifications shall be installed in a manner so as to minimize emissions from the facility by extending the contact time with oxygenated cooling tower basin waters to the maximum extent and consistent with documentation in the application and permit review issuance. Injection of iron chelated catalyst at the cooling tower basin or within the cooling tower circulating water shall be incorporated.

AC24-2 The permit holder shall properly install and maintain a properly sized, winterized condensate (cooling tower working water, condensate reroute valving and piping) H₂S abatement system modification incorporating the availability of an iron chelate (Fe•HEDTA) catalyst, hydrogen peroxide, and other additives as approved by the APCO, to achieve an overall emissions rate specified in A/C 80-034A.

AC24-3 BRPC shall cause to be performed tests that establish compliance with permit emissions limitations under anticipated plant and AECS components operating scenarios, consistent with existing facility AQMD permits and the DOC. This shall include cooling tower stack source testing as described in Appendix 2 of the permit reviews and the DOC. Planned operating scenarios shall be described in writing, include required emission testing protocols, and be provided the APCO a minimum of two weeks prior to any operational tests or scheduled source testing. To the extent possible, operating scenarios shall identify measurable parameters that can indicate compliance, or the lack thereof to be correlated with cooling tower stack emissions testing.

A source test plan consistent with the facility permit requirements to determine H₂S emissions, for any operating scenario of more than one week duration, shall be provided two weeks prior to testing the scenario. Source tests plans shall be approved by the AQMD prior to testing. Required cooling tower stack source testing can be delayed and H₂O₂ addition presumed unnecessary, unless requested by the APCO, provided all of the following are met: 1) AECS components are available, supplied and operable; 2) the cooling tower basin water has excess available dissolved oxygen and the hot well condensate is directed to the cooling tower basin; 3) incoming steam is 450 ppmw H₂S or less; 4) the Fe•HEDTA concentration is 5 ppm or greater in the working water; and 5) delivered steam to tire plant does not exceed 150,000 lbs/hr.

AC24-4 The applicant shall provide the District, no less than 30 days subsequent to installation and operation of the herein authorized modification, with as-built drawings for the modification, detailing the condensate and cooling tower portions of the facility associated with secondary H₂S abatement. The submittal shall identify in detail the selected operational scenario, approved by the APCO (based on testing performed under Condition 3) to be utilized at the facility. This shall include flow routing of cooling tower working water, hot well condensate flow rate and routing, reinjection rate (H₂S rich and normal), Fe•HEDTA and all chemical feed injection rate(s) and location(s), and factors effecting contact times of dissolved H₂S in aerated working waters or with H₂O₂.

AC24-5 Except as specified in Condition 2, this permit does not modify or make less restrictive any emission limitation, reporting, and/or monitoring/testing requirements that presently exist for this facility.

AC24-6 The operator shall provide safe access for representatives of the District, ARB, or EPA to inspect, review records, or collect samples as approved by the APCO, from this facility. Should the plant be secured by locks or gates, the District shall be provided keys, combinations or other means to gain immediate access for purpose of testing or inspection.

District Permit # A/C 2006-25, Automated Supervisory Control System Modification

AC25-1 This Authority to Construct is for the replacement of the existing control systems of the power plant and steam field with a unitized automated control and reporting system, "Distributed Control System" (DCS), including several levels of redundancies, backup processors, backup power for well head automated valves, and central controls for all power plant, steam field, and abatement system operations; all other permits, associated conditions, and limitations are not modified herein. The permitted modification is described in the application for modification and evaluated in the analysis accompanying this permit issuance. Equipment utilized and/or modified which is significantly different than that described in the permit application is subject to permit application and review. A permit to operate application shall be made within one year of operation, and the permit to operate may be incorporated into the general permit for the power plant.

AC25-2 Stretford Tail gas monitor output shall be recorded on a continuous paper strip chart recorder or an APCO approved equivalent device.

AC25-3 Condition 7 of the existing geothermal power plant authority to construct permit (A/C 80-034A) shall apply to the herein-permitted modification.

and requirements contained therein for alerts, preventative maintenance, action, and reporting shall be incorporated into the DCS.

AC25-4 The applicant shall provide the District, no less than 30 days subsequent to reaching sustained plant production with the herein authorized modification, with a description, detailing location and type of instruments, processors, actuated valves, identifying alerts, action levels and failure levels that would trigger failure of the AECS or the need to utilize the emergency steam stacking (ESS) system.

AC25-5 This permit does not modify or make less restrictive any emission limitation, reporting, and/or monitoring/testing requirements that presently exist for this facility.

AC25-6 The operator shall provide safe access for representatives of the District, ARB, or EPA to inspect, review records, or collect samples as approved by the APCO, from this facility. Should the plant be secured by locks or gates, the District shall be provided keys, combinations or other means to gain immediate access for purpose of testing or inspection.

District Permit # A/C 2006-26, Steam Transmission Line Modification

AC26-1 This Authority to Construct is to modify the existing geothermal fluid (steam) transmission pipeline, steam wash, and emergency steam stacking system servicing the Bottle Rock Power Plant; all other permits, associated conditions, and limitations are not modified. The permitted modification is described in the application and evaluated in the analysis accompanying this permit issuance. The pipeline shall be constructed and operated in a manner to not increase steam stacking during scheduled and unscheduled power generation or transmission line outages or during power plant startups and shutdowns of the unit. Equipment utilized and/or modified which is significantly different than that described in the permit application is subject to permit application and review. A permit to operate application shall be made within one year of initial operation, and the subject permit shall be incorporated into the general permit for the power plant.

AC26-2 Pipeline cleanout, testing and startup emissions shall be consistent with the submitted project application and minimized to the extent feasible. The operator shall provide the District 72 hours advance notice of scheduled cleanout and testing operations and obtain prior APCO approval for the date and time of emissions release or obtain a variance.

AC26-3 All drain water discharged shall be directed to the rich condensate collection and disposal line.

AC26-4 This permit does not modify or make less restrictive any emission limitation, reporting, and/or monitoring/testing requirements that presently exist for this facility.

AC26-5 The applicant shall provide the District, no less than 30 days subsequent to installation of the herein authorized modification, with as-built drawings for the modification, including all steam or gas vent locations.

AC26-6 The operator shall provide safe access to sampling ports that enable representatives of the LCAQMD, ARB, or EPA to collect samples, as approved by the APCO, from the steam stacking muffler, condensate collection basins, or any point release of steam, gas, or emissions to the ambient air.

- 1-3 ~~DWR~~ The project owner shall use atmospheric emissions control systems as specified by the ~~obtain written approval from both LCAPCD~~ LCAQMD Authority to Construct for the Bottle Rock Power Plant (Permit # 80-034A) and approved by the CEC CPM. The emissions control systems shall include a Stretford H₂S abatement system, a secondary H₂S treatment system utilizing iron chelate injected into hot condensate, and an emergency steam ~~before using any equipment other than the Hydrogen Peroxide Stretford/surface condenser system and turbine bypass system for outages as specified in the Modified Determination of Compliance (Conditions 2 and 12).~~

Verification: ~~DWR~~ The project owner shall submit copies ~~file a copy~~ of the proposed permit application and written approval from the ~~LCAPCD~~ LCAQMD with the CEC CPM prior to beginning construction of any ~~alternative~~ H₂S emission abatement system.

- 1-4 ~~DWR~~ The project owner shall submit approved-for-construction drawings of the power plant secondary H₂S control system to the CEC CPM only if requested by the CEC CPM.

Verification: If requested, such drawings shall be submitted by ~~DWR~~ the project owner to the CEC CPM at least 30 days prior to commencing construction of the system.

- 1-5 Modified DOC Conditions DOC-14 and DOC-20 require submittal of a detailed test plan for testing the performance of the Bottle Rock plant H₂S emissions abatement systems at normal full load operation. If continuous H₂S monitors are available (determined by ~~LCAPCD~~ LCAQMD and ARB), ~~DWR~~ the project owner shall ensure that the detailed plan includes the following test parameters: (1) the test data shall reflect a minimum of 80 percent of the gross electricity generating capacity and (2), in the event that at least 30 days of qualifying data could not be obtained during the 90-day test period specified in the 1982 Modified DOC

(DOC-14), ~~DWR~~ the project owner shall continue to collect test data until the required information has been obtained. The application for a Permit to Operate shall be filed as specified in 1982 Modified DOC Condition DOC-16 and need only include the results of the performance test conducted during the initial 90 days of commercial operation.

Verification: ~~DWR~~ The project owner shall provide the CEC CPM with a copy of the detailed plan submitted to the ~~LCAPCD~~ LCAQMD for review and approval and a copy of the plan as approved. In addition, if the test period extends beyond the initial 90 days after commercial operation, ~~DWR~~ the project owner shall file a supplementary report with the CEC CPM and the ~~LCAPCD~~ LCAQMD which reflects all the results of the performance test.

- 1-6 ~~DWR~~ The project owner shall, if requested by the ~~Lake County Air Pollution Control District~~ LCAQMD, operate and maintain an on-site meteorological station capable of determining wind direction, wind speed, and temperature and provide resultant data to the LCAQMD.

Verification: ~~DWR~~ The project owner shall furnish proof of installation and maintenance of the meteorological station and submission of the data there from such data in a form acceptable to the ~~LCAPCD~~ LCAQMD. The submittals shall be noted in periodic compliance reports filed with the CEC CPM.

- 1-7 ~~DWR~~ The project owner shall participate in Geysers' Air Monitoring Program (GAMP) III for the life of the program.

Verification: ~~DWR~~ The project owner shall submit in the Annual Compliance Report a statement describing project owner's participation in GAMP.

- 1-8 ~~During the suspension period,~~ ~~DWR~~ The project owner shall maintain all existing Authorities to Construct (ATCs) and Permits to Operate (PTOs) required under Lake County Air Quality Management District (LCAQMD) regulations.

Verification: ~~DWR~~ The project owner shall submit in the Annual Compliance Report to the CEC CPM appropriate confirmation from the LCAQMD that all ATCs and PTOs are current and active under the terms and Conditions of LCAQMD Rules and Regulations.

~~DWR~~ The project owner shall also include in this report a statement identifying regarding any complaints and actions of resolution for air quality for the Bottle Rock facility.

~~For the duration of the suspension and any time when the plant is operating,~~ ~~project~~ ~~DWR~~ The project owner shall submit an Annual Compliance Report for each calendar year no later than February 15th, of the year following the reporting year.

References

CARB (California Air Resources Board). 2006. Attainment and Area Designations Maps / State and National. October 2006.

LCAPCD (Lake County Air Pollution Control District). 1980. Determination of Compliance (DOC), DWR/Bottle Rock Geothermal Power Plant. September 24, 1982.

LCAPCD (Lake County Air Pollution Control District). 1982. Modified Determination of Compliance (DOC), DWR/Bottle Rock Geothermal Power Plant. February 22, 1982.

LCAQMD (Lake County Air Quality Management District). 2006a. Permitting Review for Bottle Rock Power Corporation. August 30, 2006.

**Bottle Rock Geothermal Power Project (79-AFC-4C)
Petition to Change the Ownership, Allow the Restart of Operation After
Suspension, and Allow 11 Facility Design Changes
Biological Resources Staff Analysis
Prepared by Marc Sasaki
September 19, 2006**

Setting

The Bottle Rock Power Plant is situated on the east side of the Mayacmas Mountains at approximately 2700 feet (822.9 meters) elevation in close proximity to the headwater tributaries of High Valley Creek and Alder Creek. It is about 2.5 miles northwest of Cobb Mountain in the Lake County portion of the Geysers Known Geothermal Resources Area. The topography includes both flat and gently rolling to steep hills generally characterized by a non-urbanized and sparsely populated landscape and highly erodible soils. Vegetation surrounding the power plant is primarily pine-oak woodland interspersed with grasslands and shrubby stands of chaparral (Figure 1). This natural environment provides quality habitat for an array animal species.



Figure 1 – View to ENE toward Bottle Rock Power Plant from upper Coleman Well Pad.

Applicable Laws, Ordinances and Regulations and Standards (LORS)

FEDERAL

• **Endangered Species Act of 1973**

Title 16, United States Code, section 1531 et seq., and Title 50, Code of Federal Regulations, part 17.1 et seq., designate and provide for protection of threatened and endangered plant and animal species, and their critical habitat.

- **Migratory Bird Treaty Act**

Title 16, United States Code, sections 703-712, prohibit the take of migratory birds.

STATE

- **California Endangered Species Act of 1984**

Fish and Game Code sections 2050 et seq., protect California's rare, threatened and endangered species.

- **Nest Or Eggs-Take, Possess, or Destroy**

Fish and Game Code section 3503 protects California's birds by making it unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto.

- **Birds of Prey or Eggs-Take, Possess, or Destroy**

Fish and Game Code section 3503.5, protects California's birds of prey and their eggs by making it unlawful to take, possess, or destroy any birds of prey or to take, possess, or destroy the nest or eggs of any such bird, except as otherwise provided by this code or any regulation made pursuant thereto.

- **Migratory Birds-Take or Possession**

Fish and Game section 3513 protects California's migratory birds by making it unlawful to take or possess any migratory non-game bird as designated in the Migratory Bird Treaty Act or any part of such migratory non-game bird.

- **Fully Protected Species**

Fish and Game Code sections 3511, 4700, prohibit take of animals that are classified as Fully Protected in California. Both Section 3511 (b)(1) lists American peregrine falcon (*Falco peregrinus anatum*), and, Section 4700(b)(5) lists ring-tailed cat (genus *Bassariscus*) as fully protected.

- **Significant Natural Areas**

Fish and Game Code section 1930 et seq. designate certain areas such as refuges, natural sloughs, riparian areas and vernal pools as significant wildlife habitat.

- **Streambed Alteration Agreement**

Fish and Game Code section 1600 et seq., require the California Department of Fish and Game to review project impacts to waterways, including impacts to vegetation and wildlife from sediment, diversions and other disturbances.

- **Native Plant Protection Act of 1977**

Fish and Game Code Section 1900-1904 state that "The intent of the Legislature and the purpose of this chapter is to preserve, protect and enhance endangered or rare native plants of this state.", and; Section 1911 states that "All state departments and agencies shall, in consultation with the department, utilize their authority in furtherance of the purposes of this chapter by carrying out programs for the conservation of endangered or rare native plants. Such programs include, but are not limited to, the

identification, delineation and protection of habitat critical to the continued survival of endangered or rare native plants.

• **California Code of Regulations**

Public Resources Code, Section 25003, specifies "...in planning for future electrical generating and related transmission facilities...environmental protection,... should be considered."

Public Resources Code, Section 25527, states that "...the commission shall give the greatest consideration to the need for protecting areas of critical environmental concern, including, but not limited to, unique and irreplaceable scientific, scenic, and educational wildlife habitats; ... and areas under consideration by the state or the United States for wilderness, or wildlife and game reserves.

Analysis

The Bottle Rock power plant went off line in November 1990 and its owner at the time (California Department of Water Resources) petitioned to suspend operations at the power plant and steam field in January of 1991. Subsequently, some of the Biological Resources Conditions of Certification (COC) were modified to monitor conditions potentially affecting biological resources during the suspension period, while some of the COC were postponed. During this time, from 1991 through 2000 and again in 2002 and 2005, monitoring of mitigation effectiveness as well as potential project-related negative effects on biological resources, as described in annual compliance monitoring reports, did not identify any recognizably significant problems that needed special attention or treatment by CEC staff or other agency personnel.

Activities needed to prepare the power plant for restart are not expected to have any significant affect on flora and fauna in the surrounding area. These activities are identified as installing vacuum pumps to maintain vacuum in the condenser versus reliance upon steam injectors; installing a distributive control system for the plant; adding a new skim line in the Stretford H₂S abatement system; adding a mercury vapor filter upstream of the Stretford H₂S abatement system; adding air spargers to the oxidizer tanks in the Stretford H₂S abatement system; changing the operation and design of the secondary H₂S abatement system; adding a second main steam line isolation valve; installing a variable speed, automating steam stacking system; installing a new design in the steam washing system; adding a steam sampling point downstream of the Burgess Manning main steam separator; and installing exterior lighting abatement improvements, all within the fenced area surrounding the power plant.

The petition to amend the final decision proposes that all the conditions of certification that were suspended by order of the CEC during the suspension period be activated and those conditions that remained active continue in that mode. CEC staff on the other hand recommends discontinuing conditions of certification 5-1.c., 5-1.d., 5-1.g., 5-1.h., 5-3.e., 5-3.f., 5-3.g., and 5-4, while restoring and/or modifying Conditions of Certification 5-1.a., 5-1.b., 5-1.e., 5-1.f., 5-2., 5-3.a., 5-3.b., 5-3.c., 5-3.d., 5-3.h., 5-3.i., and 5-3.j. This is the result of reviewing monitoring information collected for boron soil and vegetation deposition concentrations (mg/l) since 1985, surface water quality

measurements since 1982, ground water quality measurements since 1987, bird nest box utilization since 1982, wildlife watering basin usage since 1987, and deer use of revegetation and control plots since 1992. This monitoring information is examined in relation to what is perceived as current environmental conditions in the vicinity of the project.

A new factor considered includes the risk of workers colliding with or running over animals on the primary access road leading to the power plant. This should be minimized because of the low speed limit imposed by the project owner for safety reasons with regard to residents living nearby.

Another new concern developed during a site inspection in June of 2005. CEC staff observed a number of small amphibians and reptiles trapped in various pits and vaults that had been left open on the Francisco well pad and at the power plant site. Now that the project is being readied for operation, all these potential traps have since been covered and are not expected to pose a potential threat to small animals that are susceptible to this sort of mortality. A site visit by CEC staff in July of 2006 verified this. CEC biology staff has not revisited the site since July of 2006, therefore, the present status of this situation is uncertain.

An additional potential issue on the plant site is related to nesting cliff swallows (*Petrochelidon pyrronota*) that have used the turbine building as an attachment structure for mud nests or other structural features for supporting stick nests. A stick nest was observed on the July 2006 site visit, but no bird was using it at the time. It is most likely a raptor or raven nest. The cliff swallows are migratory and as such, are protected under the Migratory Bird Treaty Act. The birds that built and use the stick nest may be legally protected and any effort to remove it would have to be done under guidance and/or authorization from the appropriate responsible agency.

These new factors can be addressed by incorporating the appropriate action protocols into a revised Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP) which will be required for approval of the petition.

Prior to project construction, a sensitive plant species, the Napa lomatium (*Lomatium respostum*), was identified as being in the project area and given special consideration and protection. Now, another species, Brandegees' eriastrum (*Eriastrum brandegeae*) with a more compromised status (CNPS list 1B) has been identified within a mile of the project, so it is currently a matter of concern (CNDDDB 2006). Even though the project owner does not anticipate doing any work off the footprint (fenced-in and paved surface) of the project, provision should be made to protect these species in the unforeseen circumstance that work has to be done off site. This can be accomplished by addressing it in a revised BRMIMP.

Annual compliance monitoring reports from 2001 to the present, indicate either some of the monitoring was not fully carried out, or was not reported (BRPC 2003) (BRPC 2006). Notwithstanding this lack of recent information, it appears that boron deposition and uptake by vegetation near the power plant has declined from nearly 2750 and 1300 mg/l respectively to less than about 200 mg/l for both environmental pathways, with a

relatively slight rise in deposition -to about 400 mg/l and uptake to 225 mg/l for the last year reported (2002). Original vegetation injury by boron laden steam was caused by a steam scrubbing system failure whereby steam stacked (released) through a rock muffler allowed direct deposits on nearby vegetation (DWR 1993). This undoubtedly resulted in the high deposition and uptake boron concentrations reported above. A redesigned steam washing system will be employed through which boron, ammonia, and fine particle removal will be considerably enhanced over the previous methodology. Also, the drift eliminators in the cooling towers will be refurbished (According to Ron Suess, President of Bottle Rock Power, LLC). As such, they will likely attain their design ratings, thus minimizing drift to the extent practicable. Probably the only process that would preclude boron escaping into the environment from the confines of the power plant site would be some form of dry cooling. This is likely to be economically infeasible, although biology staff is not qualified to do such an economic analysis. Biology staff is unaware of any geothermal power plant in The Geysers Known Geothermal Resource Area that uses dry cooling. Visual inspections of the vegetation in the vicinity of the project should be done on a quarterly basis to determine if steam emissions or cooling tower drift could be affecting this vegetation. The CEC CPM will determine if boron deposition monitoring should be resumed for soil/duff and vegetation. Historically gathered data will be used for comparison of deposition and foliar injury.

Surface water and groundwater sampling results have not been especially noteworthy in terms of being potentially harmful to biota in the area (DWR 1994) (BRPC 2003) (BRPC 2006). Physical and chemical characteristics have remained fairly consistent for surface water quality measurements collected periodically from the early 1980's at comparable sampling stations for the same constituents (Karfiol, R.C. and L.E. McMillan 1983) (McMillan, L.E. 1985) (DWR 1994) (BRPC 2003) (BRPC 2006). However, a few unusual spikes in lead and zinc were reported at a station on High Valley Creek and on Alder Creek (Tables 1a-d & 2a-d). Similar results did not occur with the groundwater samples. If the higher surface water concentrations become chronic and are determined to be at levels deleterious to aquatic life, further efforts should be undertaken to see if the source is from operational and/or maintenance activities at the project. Surface water and groundwater monitoring should continue on a regular basis. Ground water monitoring should be continued as a precautionary measure. However, unless surface water sampling shows consistent and prolonged high concentrations that could negatively affect aquatic biota, aquatic invertebrate sampling is not recommended. The determination of need for invertebrate sampling will be made by CEC staff in consultation with the California Department of Fish and Game (CDFG) staff.

Nest box use by secondary hole nesting birds has been measurably successful with oak titmouse (*Parus inornatus*) and western bluebird (*Sialia mexicana*) using boxes in all years from 1982 through 2002. No monitoring was conducted in 2001 so it is uncertain if these species used the boxes in 2001 (BRPC 2003). House wren (*Troglodytes aedon*) and white-breasted nuthatch (*Sitta carolinensis*) used the boxes in all years but one, not including 2001 when monitoring was not done and these species use of the boxes could not be established. The nest boxes must be checked annually during the non-nesting period and maintained in useable condition.

Table 1a
Bottle Rock Power Plant – Surface Water Field Parameters and Physical Characteristics

Sample Station	Sample Date	Time (PST)	Temp (°C)	pH	Spec Cond. (µS/cm)	TSS (mg/l)	Alkalinity (mgCaCO ₃ /l)	Turbidity (NTU)	D.O. (mg/l)	Hardness (mgCaCO ₃ /l)
SW-6	07/10/02	1015	16.5	8.0	300	<2.0	170	.41	8.4	200
	07/01/05	0950	15.8	7.9	280	5.5	140	<.20	8.1	150
	10/31/02	1150	14.6	7.9	220	<2.0	140	.27	9.3	160
	10/19/05	0935	14.6	6.3	230	<5.0	120	<5.0	8.8	110
Ke-25.9 ¹	1981-82	*	6.1-18.9	7.2-8.4	73-130	<2.0-23.0	37-59	.40-19.0	9.1-11.0	*
SW-7	1982-83	*	8.9-21.1	7.2-7.9	87-151	1.0-20.0	35-68	.80-15.0	8.6-10.7	40-45
	07/10/02	1145	15.2	8.0	120	<2.0	66	1.2	8.5	59
	07/01/05	1005	15.1	7.7	140	<5.0	66	0.59	8.1	63
	10/31/02	0925	13.8	7.3	91	<2.0	57	.65	9.8	46
	10/19/05	0925	14.8	6.4	140	<5.0	68	.74	8.7	55
HiV-0.2 ¹	1981-82	*	6.1-20.0	7.3-7.9	81-290	<2.0-11.0	46-169	.25-14.0	8.2-11.4	*
SW-8	1982-83	*	8.9-24.4	7.3-7.9	130-319	2.0-23.0	60-167	.35-10.0	7.9-10.3	64-120
	07/10/02	1200	14.5	7.9	310	<2.0	180	.30	8.3	200
	07/01/05	1045	14.9	7.8	280	8.9	150	<.20	8.0	150
	10/31/02	0940	14.8	7.3	280	<2.0	180	.21	9.4	200
	10/19/05	1040	14.8	7.1	340	13	180	1.50	7.8	170
Al-0.1 ¹	1981-82	*	7.8-21.1	7.0-8.2	53-90	<2.0-9.3	24-40	.40-14.00	8.4-11.0	*
SW-9	1982-83	*	7.1-13.4	7.1-7.6	59-103	<2.0-7.3	25-46	.65-5.40	7.9-10.9	24-50
	07/10/02	1055	16.5	7.8	69	<2.0	37	.56	8.3	28
	07/01/05	1055	15.9	7.5	90	15	42	<.20	8.0	37
	10/31/02	1045	14.6	8.1	52	<2.0	33	.63	10.0	22
	10/19/05	1125	14.6	7.1	68	<5.0	32	<5.0	8.8	21
Ke-30.9 ¹	1981-82	*	7.5-17.2	7.1-7.7	56-101	<2.0-19	27-47	.30-27.00	8.7-10.9	*
SW-10	1982-83	*	8.3-20.0	7.0-7.5	64-112	<2.0-14	25-51	1.20-8.90	8.2-10.9	25-25
	07/10/02	0915	16.1	7.8	98	<2.0	54	1.90	8.5	97
	07/01/05	1130	16.4	7.4	100	69	48	1.20	7.7	41
	10/31/02	1105	14.5	7.3	86	<2.0	53	1.20	9.7	39
	10/19/05	1315	14.5	7.0	110	<5.0	51	.92	8.8	38

¹ Comparable Stations Sampled in the Geysers Calistoga KGRA-ARM Program
 (Results give the range for monthly sampling from 1981-83.)

* Data not reported.

SW-6 Kelsey Creek near Kelseyville
 SW-7 Kelsey Creek above High Valley Creek
 SW-8 High Valley Creek above Kelsey Creek
 SW-9 Alder Creek above Glenbrook
 SW-10 Kelsey Creek above Glenbrook

mg/l = milligrams per liter
 PST = Pacific Standard Time
 µS/cm = microSiemens per centimeter

Table 1b

Bottle Rock Power Plant – Surface Water Parameters and Physical Characteristics

Sample Station	Sample Date	Time (PST)	Temp (°C)	pH	Spec Cond. (µS/cm)	TSS (mg/l)	Alkalinity (mgCaCO ₃ /l)	Turbidity (NTU)	D.O. (mg/l)	Hardness (mgCaCO ₃ /l)
SW-6	07/10/02	1015	16.5	8.0	300	<2.0	170	.41	8.4	200
	10/31/02	1150	14.6	7.9	220	<2.0	140	.27	9.3	160
	07/01/05	0950	15.8	7.9	280	5.5	140	<0.20	8.1	150
	10/19/05	0935	14.6	6.3	230	<5.0	120	<5.0	8.8	110
Ke-25.9 ¹	1981-82	*	6.1-18.9	7.2-8.4	73-130	<2.0-23.0	37-59	.40-19.0	9.1-11.0	*
	1982-83	*	8.9-21.1	7.2-7.9	87-151	1.0-20.0	35-68	.80-15.0	8.6-10.7	40-45
SW-7	07/10/02	1145	15.2	8.0	120	<2.0	66	1.2	8.5	59
	10/31/02	0925	13.8	7.3	91	<2.0	57	.65	9.8	46
	07/01/05	1005	15.1	7.7	140	<5.0	66	0.59	8.1	63
	10/19/05	0925	14.8	6.4	140	<5.0	68	0.74	8.7	55
HiV-0.2 ¹	1981-82	*	6.1-20.0	7.3-7.9	81-290	<2.0-11.0	46-169	.25-14.0	8.2-11.4	*
	1982-83	*	8.9-24.4	7.3-7.9	130-319	2.0-23.0	60-167	.35-10.0	7.9-10.3	64-120
SW-8	07/10/02	1200	14.5	7.9	310	<2.0	180	.30	8.3	200
	10/31/02	0940	14.8	7.3	280	<2.0	180	.21	9.4	200
	07/01/05	1045	14.9	7.8	280	8.9	150	<0.20	8.0	150
	10/19/05	1040	14.8	7.1	340	13	180	1.50	7.8	170
Al-0.1 ¹	1981-82	*	7.8-21.1	7.0-8.2	53-90	<2.0-9.3	24-40	.40-14.00	8.4-11.0	*
	1982-83	*	7.1-13.4	7.1-7.6	59-103	<2.0-7.3	25-46	.65-5.40	7.9-10.9	24-50
SW-9	07/10/02	1055	16.5	7.8	69	<2.0	37	.56	8.3	28
	10/31/02	1045	14.6	8.1	52	<2.0	33	.63	10.0	22
	07/01/05	1055	15.9	7.5	90	15	42	<0.20	8.0	37
	10/19/05	1125	14.6	7.1	68	<5.0	32	<5.0	8.8	21
Ke-30.9 ¹	1981-82	*	7.5-17.2	7.1-7.7	56-101	<2.0-19	27-47	.30-27.00	8.7-10.9	*
	1982-83	*	8.3-20.0	7.0-7.5	64-112	<2.0-14	25-51	1.20-8.90	8.2-10.9	25-25
SW-10	07/10/02	0915	16.1	7.8	98	<2.0	54	1.90	8.5	97
	10/31/02	1105	14.5	7.3	86	<2.0	53	1.20	9.7	39
	07/01/05	1130	16.4	7.4	100	69	48	1.20	7.7	41
	10/19/05	1315	14.5	7.0	110	<5.0	51	0.92	8.8	38

¹ Comparable Stations Sampled in the Geysers Calistoga KGRA-ARM Program (Results give the range for monthly sampling from 1981-83.)

* Data not reported.

SW-6 Kelsey Creek near Kelseyville
 SW-7 Kelsey Creek above High Valley Creek
 SW-8 High Valley Creek above Kelsey Creek
 SW-9 Alder Creek above Glenbrook
 SW-10 Kelsey Creek above Glenbrook

mg/l = milligrams per liter
 PST = Pacific Standard Time
 µS/cm = microSiemens per centimeter

Table 1c
Bottle Rock Power Plant - Surface Water Chemical Analyses

Sample Station	Sample Date	Time (PST)	Magnesium (mg/l)	Calcium (mg/l)	Sulphate (mg/l)	Boron (mg/l)	Copper (mg/l)	Iron (mg/l)	Lead (mg/l)	Manganese (mg/l)	Sodium (mg/l)	Zinc (mg/l)
SW-6	07/10/02	1015	37	20	2.2	0.11	<0.05	<0.01	<0.05	<0.03	6.5	<0.05
	07/01/05	0950	27	17	2.3	0.15	<0.05	<0.10	<0.05	<0.03	5.4	<0.05
	10/31/02	1150	32	16	<2.0	0.41	<0.05	<0.01	<0.05	<0.03	8.3	<0.05
	10/19/05	0935	12	20	<2.0	0.12	<0.05	<0.01	<0.05	<0.03	5.4	<0.05
Ke-25.9 ¹	1981-82	*	*	*	1.1-7.4	<0.25-10	<0.002-<0.002	.027-.706	<0.010-<0.010	<0.010-.015	*	.007-.056
	1982-83	*	*	*	<1.0-30.0	<0.05-10	<0.002-<0.003	.060-.250	<0.010-<0.010	<0.010-.016	*	<0.001-.013
SW-7	07/10/02	1145	9.4	8.2	<2.0	0.05	<0.05	<0.01	<0.05	<0.03	5.2	<0.05
	07/01/05	1005	10	8.7	<2.0	0.11	<0.05	<0.10	<0.05	<0.03	4.7	<0.05
	10/31/02	0925	7	6.7	<2.0	0.25	<0.05	<0.01	<0.05	<0.03	7.1	<0.05
	10/19/05	0925	7.7	9.2	<2.0	0.079	<0.05	<0.01	<0.05	<0.03	4.9	<0.05
HiV-0.2 ¹	1981-82	*	*	*	1.0-5.3	<0.05-.18	<0.002-<0.002	.075-.740	<0.010-<0.010	.013-.024	*	.004-.057
	1982-83	*	*	*	<1.0-7.0	<0.05-.12	<0.002-<0.003	.050-.150	<0.010-<0.010	<0.010-.020	*	<0.001-.040
SW-8	07/10/02	1200	25	41	3.6	0.11	<0.05	<0.01	<0.05	<0.03	6.3	<0.05
	07/01/05	1045	17	34	3.8	0.11	<0.05	<0.10	<0.05	<0.03	5	<0.05
	10/31/02	0940	25	40	4.3	0.21	<0.05	<0.01	<0.05	<0.03	8.4	<0.05
	10/19/05	1040	20	37	4.3	0.14	<0.05	<0.01	<0.05	<0.03	6.6	<0.05
Al-0.1 ¹	1981-82	*	*	*	<1.0-3.2	<0.25-.11	<0.002-<0.002	.110-.309	<0.010-<0.010	<0.010-.075	*	.003-.054
	1982-83	*	*	*	<1.0-4.9	<0.05-.15	<0.002-.005	.060-.180	<0.010-<0.010	<0.001-.012	*	<0.001-.019
SW-9	07/10/02	1055	3.4	5.7	<2.0	<0.05	<0.05	<0.01	<0.05	<0.03	3.8	<0.05
	07/01/05	1055	4.2	7.8	<2.0	0.07	<0.05	<0.10	<0.05	<0.03	3.8	<0.05
	10/31/02	1045	2.6	4.4	<2.0	0.18	<0.05	<0.01	<0.05	<0.03	5.4	0.078
	10/19/05	1125	2.5	4.4	<2.0	0.066	<0.05	<0.01	<0.05	<0.03	3.7	0.078
Ke-30.9 ¹	1981-82	*	*	*	1.1-5.1	<0.25-.05	<0.002-<0.002	.090-.550	<0.010-<0.010	<0.010-.014	*	.005-.052
	1982-83	*	*	*	<1.0-5.3	<0.05-.08	<0.002-<0.003	.088-.220	<0.010-<0.010	<0.001-<0.010	*	<0.001-.008
SW-10	07/10/02	0915	19	7.6	<2.0	<0.05	<0.05	<0.01	0.11	<0.03	5.4	<0.05
	07/01/05	1130	5.6	7.1	<2.0	<0.05	<0.05	<0.10	<0.05	<0.03	4.6	<0.05
	10/31/02	1105	5.4	7	<2.0	0.1	<0.05	<0.01	0.076	<0.03	7.5	0.061
	10/19/05	1315	4.9	7	<2.0	<0.05	<0.05	<0.01	0.076	<0.03	5.0	0.061

¹ Comparable Stations Sampled in the Geysers Calistoga KGRA-ARM Program
 (Results give the range for monthly sampling from 1981-83.)

* Data not reported.

SW-6 Kelsey Creek near Kelseyville
 SW-7 Kelsey Creek above High Valley Creek
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mg/l = milligrams per liter
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Table 1d
Bottle Rock Power Plant - Surface Water Chemical Analyses

Sample Station	Sample Date	Time (PST)	Magnesium (mg/l)	Calcium (mg/l)	Sulphate (mg/l)	Boron (mg/l)	Copper (mg/l)	Iron (mg/l)	Lead (mg/l)	Manganese (mg/l)	Sodium (mg/l)	Zinc (mg/l)
SW-6	07/10/02	1015	37	20	2.2	0.11	<0.05	<0.01	<0.05	<0.03	6.5	<0.05
	10/31/02	1150	32	16	<2.0	0.41	<0.05	<0.01	<0.05	<0.03	8.3	<0.05
	07/01/05	0950	27	17	2.3	0.15	<0.05	<0.10	<0.05	<0.03	5.4	<0.05
	10/19/05	0935	12	20	<2.0	0.12	<0.05	<0.01	<0.05	<0.03	5.4	<0.05
Ke-25.9 ¹ SW-7	1981-82	*	*	*	1.1-7.4	<0.25-.10	<0.002-<0.002	.027-.706	<0.010-<0.010	<0.010-.015	*	.007-.056
	1982-83	*	*	*	<1.0-30.0	<0.05-.10	<0.002-<0.003	.060-.250	<0.010-<0.010	<0.010-.016	*	<.001-.013
	07/10/02	1145	9.4	8.2	<2.0	0.05	<0.05	<0.01	<0.05	<0.03	5.2	<0.05
	10/31/02	0925	7	6.7	<2.0	0.25	<0.05	<0.01	<0.05	<0.03	7.1	<0.05
	07/01/05	1005	10	8.7	<2.0	0.11	<0.05	<0.10	<0.05	<0.03	4.7	<0.05
10/19/05	0925	7.7	9.2	<2.0	0.079	<0.05	<0.01	<0.05	<0.03	4.9	<0.05	
HiV-0.2 ¹ SW-8	1981-82	*	*	*	1.0-5.3	<0.05-.18	<0.002-<0.002	.075-.740	<0.010-<0.010	.013-.024	*	.004-.057
	1982-83	*	*	*	<1.0-7.0	<0.05-.12	<0.002-<0.003	.050-.150	<0.010-<0.010	<0.010-.020	*	<.001--.040
	07/10/02	1200	25	41	3.6	0.11	<.05	<0.01	<0.05	<0.03	6.3	<0.05
	10/31/02	0940	25	40	4.3	0.21	<.05	<0.01	<0.05	<0.03	8.4	<0.05
	07/01/05	1045	17	34	3.8	0.11	<0.05	<0.10	<0.05	<0.03	5	<0.05
10/19/05	1040	20	37	4.3	0.14	<0.05	<0.01	<0.05	<0.03	6.6	<0.05	
Al-0.1 ¹ SW-9	1981-82	*	*	*	<1.0-3.2	<0.25-.11	<0.002-<0.002	.110-.309	<0.010-<0.010	<0.010-.075	*	.003-.054
	1982-83	*	*	*	<1.0-4.9	<0.05-.15	<0.002-.005	.060-.180	<0.010-<0.010	<0.001-.012	*	<.001-.019
	07/10/02	1055	3.4	4.4	<2.0	<0.05	<0.005	<0.01	<0.05	<0.03	3.8	<0.05
	10/31/02	1045	2.6	7.8	<2.0	0.18	<0.05	<0.10	<0.05	<0.03	5.4	0.078
	07/01/05	1055	4.2	4.4	<2.0	0.07	<0.05	<0.01	<0.05	<0.03	3.8	<0.05
10/19/05	1125	2.5		<2.0	0.066	<0.05	<0.01	<0.05	<0.03	3.7	0.078	
Ke-30.9 ¹ SW-10	1981-82	*	*	*	1.1-5.1	<0.25-.05	<0.002-<0.002	.090-.550	<0.010-<0.010	<0.010-.014	*	.005-.052
	1982-83	*	*	*	<1.0-5.3	<0.05-.08	<0.002-<0.003	.088-.220	<0.010-<0.010	<.001-<0.010	*	<.001-.008
	07/10/02	0915	19	7.6	<2.0	<0.05	<0.05	<0.01	0.11	<0.03	5.4	<0.05
	10/31/02	1105	5.4	7	<2.0	0.1	<0.05	<0.01	0.076	<0.03	4.6	0.061
	07/01/05	1130	5.6	7.1	<2.0	<0.05	<0.05	<0.10	<0.05	<0.03	7.5	<0.05
10/19/05	1315	4.9	7	<2.0	<0.05	<0.05	<0.01	0.076	<0.03	5.0	0.061	

¹ Comparable Stations Sampled in the Geysers Calistoga KGRA-ARM Program
 (Results give the range for monthly sampling from 1981-83.)

* Data not reported.

SW-6 Kelsey Creek near Kelseyville
 SW-7 Kelsey Creek above High Valley Creek
 SW-8 High Valley Creek above Kelsey Creek
 SW-9 Alder Creek above Glenbrook
 SW-10 Kelsey Creek above Glenbrook

mg/l = milligrams per liter
 PST = Pacific Standard Time
 μS/cm = microSiemens per centimeter

Table 2a

Bottle Rock Power Plant – Ground Water Field Parameters and Physical Characteristics

Sample Station	Sample Date	Time (PST)	Temp (°C)	pH	Spec Cond. (µS/cm)	TSS (mg/l)	Alkalinity (mgCaCO ₃ /l)	Turbidity (NTU)	D.O. (mg/l)	Hardness (mgCaCO ₃ /l)
GW-1	07/11/02	1100	16.2	7.5	340	<2.0	180	0.24	4.4	200
	07/01/05	1100	16.1	7.00	300	<5.0	170	<.20	9.6	190
	11/05/02	1035	16.1	7.3	310	<2.0	190	0.40	5.6	200
	10/20/05	1035	16.2	6.54	360	<5.0	180	<5.0	3.9	200
GW-2	07/10/02	1200	14.9	7.4	280	<2.0	160	<0.20	8.8	180
	07/01/05	1200	14.8	6.96	280	<5.0	140	<0.20	9.1	160
	11/05/02	0830	15.8	7.1	250	<2.0	160	0.21	8.3	210
	10/20/05	0830	15.7	7.03	310	<5.0	160	<5.0	8.4	130
GW-3	07/11/02	1000	14.6	7.8	320	<2.0	180	0.21	5.4	150
	07/01/05	*	*	*	*	*	*	*	*	*
	11/05/02	1155	13.8	7.6	290	<2.0	190	0.47	6.6	150
	10/20/05	1155	14.4	7.01	340	<5.0	180	<5.0	4.3	140
GW-4	07/11/02	1015	16.8	8.2	190	<2.0	110	0.22	3.4	84
	07/01/05	1420	16.4	8.01	290	<5.0	140	<.20	8.3	33
	11/05/02	1315	16.1	7.9	240	<2.0	160	2.00	6.1	36
	10/20/05	1315	16	7.61	270	<5.0	140	<5.0	4.9	55
GW-5	07/11/02	*	*	*	*	*	*	*	*	*
	07/01/05	*	*	*	*	*	*	*	*	*
	11/05/02	*	*	*	*	*	*	*	*	*
	10/20/05	1315	16.3	7.34	300	<5.0	160	<5.0	8.4	160

SW-6 Kelsey Creek near Kelseyville
 SW-7 Kelsey Creek above High Valley Creek
 SW-8 High Valley Creek above Kelsey Creek
 SW-9 Alder Creek above Glenbrook
 SW-10 Kelsey Creek above Glenbrook

mg/l = milligrams per liter
 PST = Pacific Standard Time
 µS/cm = microSiemens per centimeter

* Data not reported.

Table 2b

Bottle Rock Power Plant – Ground Water Field Parameters and Physical Characteristics

Sample Station	Sample Date	Time (PST)	Temp (°C)	pH	Spec Cond. (µS/cm)	TSS (mg/l)	Alkalinity (mgCaCO ₃ /l)	Turbidity (NTU)	D.O. (mg/l)	Hardness (mgCaCO ₃ /l)
GW-1	07/11/02	1100	16.2	7.5	340	<2.0	180	0.24	4.4	200
	11/05/02	1035	16.1	7.3	310	<2.0	190	0.40	5.6	200
	07/01/05	1100	16.1	7.00	300	<5.0	170	<.20	9.6	190
	10/20/05	1035	16.2	6.54	360	<5.0	180	<5.0	3.9	200
GW-2	07/10/02	1200	14.9	7.4	280	<2.0	160	<0.20	8.8	180
	11/05/02	0830	15.8	7.1	250	<2.0	160	0.21	8.3	210
	07/01/05	1200	14.8	6.96	280	<5.0	140	<0.20	9.1	160
	10/20/05	0830	15.7	7.03	310	<5.0	160	<5.0	8.4	130
GW-3	07/11/02	1000	14.6	7.8	320	<2.0	180	0.21	5.4	150
	11/05/02	1155	13.8	7.6	290	<2.0	190	0.47	6.6	150
	07/01/05	*	*	*	*	*	*	*	*	*
	10/20/05	1155	14.4	7.01	340	<5.0	180	<5.0	4.3	140
GW-4	07/11/02	1015	16.8	8.2	190	<2.0	110	0.22	3.4	84
	11/05/02	1315	16.1	7.9	240	<2.0	160	2.00	6.1	36
	07/01/05	1420	16.4	8.01	290	<5.0	140	<.20	8.3	33
	10/20/05	1315	16	7.61	270	<5.0	140	<5.0	4.9	55
GW-5	07/11/02	*	*	*	*	*	*	*	*	*
	11/05/02	*	*	*	*	*	*	*	*	*
	07/01/05	*	*	*	*	*	*	*	*	*
	10/20/05	1315	16.3	7.34	300	<5.0	160	<5.0	8.4	160

SW-6 Kelsey Creek near Kelseyville
 SW-7 Kelsey Creek above High Valley Creek
 SW-8 High Valley Creek above Kelsey Creek
 SW-9 Alder Creek above Glenbrook
 SW-10 Kelsey Creek above Glenbrook

mg/l = milligrams per liter
 PST = Pacific Standard Time
 µS/cm = microSiemens per centimeter

* Data not reported.

Table 2c
Bottle Rock Power Plant - Ground Water Chemical Analyses

Sample Station	Sample Date	Time (PST)	Magnesium (mg/l)	Calcium (mg/l)	Sulphate (mg/l)	Boron (mg/l)	Copper (mg/l)	Iron (mg/l)	Lead (mg/l)	Manganese (mg/l)	Mercury (µg/l)	Sodium (mg/l)	Zinc (mg/l)
GW-1	07/11/02	1100	16	55	17	<0.05	<0.05	<0.10	<0.05	0.13	<0.20	8	<0.05
	07/01/05	1100	16	51	17	0.13	<0.05	<0.10	<0.05	0.13	<0.20	7.8	<0.05
	11/05/02	1035	18	50	3.5	0.57	<0.05	<0.10	<0.05	0.098	<0.20	8.8	<0.05
	10/20/05	1035	16	53	16	0.2	<0.05	<0.10	<0.05	0.11	<0.20	7.0	<0.05
GW-2	07/11/02	1200	30	23	3.3	0.05	<0.05	<0.10	<0.05	<0.03	<0.20	6.6	<0.05
	07/01/05	1200	25	24	2.6	<0.05	<0.05	<0.10	<0.05	<0.03	<0.20	4.2	<0.05
	11/05/02	0830	33	28	<2.0	0.66	<0.05	<0.10	<0.05	<0.03	<0.20	5.6	<0.05
	10/20/05	0830	10	34	7.7	0.62	<0.05	<0.10	<0.05	0.06	<0.20	24	<0.05
GW-3	07/11/02	1000	11	40	3.6	0.35	<0.05	<0.10	<0.05	0.04	<0.20	23	<0.05
	07/01/05	*	*	*	*	*	*	*	*	*	*	*	*
	11/05/02	1155	12	39	<2.0	0.95	<0.05	0.099	<0.05	0.045	<0.20	29	<0.05
GW-4	07/11/02	1015	9.1	19	5.4	0.14	<0.05	<0.10	<0.05	<0.03	<0.20	16	<0.05
	07/01/05	1420	2.9	8.4	<2.0	1.2	<0.05	<0.10	<0.05	<0.03	<0.20	49	<0.05
	11/05/02	1315	3.6	8.4	<2.0	1.6	<0.05	3.9	<0.05	0.031	<0.20	50	0.15
	10/20/05	1315	4.4	15	1.9	1.1	<0.05	3.9	<0.05	<0.02	<0.20	39	<0.05
GW-5	07/11/02	*	*	*	*	*	*	*	*	*	*	*	*
	07/01/05	*	*	*	*	*	*	*	*	*	*	*	*
	11/05/02	*	*	*	*	*	*	*	*	*	*	*	*
GW-5	10/20/05	1420	17	37	2.7	0.17	0.01	<0.10	<0.05	<0.02	<0.20	6.1	<0.05

* Data not reported.

SW-6 Kelsey Creek near Kelseyville
 SW-7 Kelsey Creek above High Valley Creek
 SW-8 High Valley Creek above Kelsey Creek
 SW-9 Alder Creek above Glenbrook
 SW-10 Kelsey Creek above Glenbrook

mg/l = milligrams per liter
 µg/l = micrograms per liter
 PST = Pacific Standard Time
 µS/cm = microSiemens per centimeter

Table 2d
Bottle Rock Power Plant - Ground Water Chemical Analyses

Sample Station	Sample Date	Time (PST)	Magnesium (mg/l)	Calcium (mg/l)	Sulphate (mg/l)	Boron (mg/l)	Copper (mg/l)	Iron (mg/l)	Lead (mg/l)	Manganese (mg/l)	Mercury (µg/l)	Sodium (mg/l)	Zinc (mg/l)
GW-1	07/11/02	1100	16	55	17	<0.05	<0.05	<0.10	<0.05	0.13	<0.20	8	<0.05
	11/05/02	1035	18	50	3.5	0.57	<0.05	<0.10	<0.05	0.098	<0.20	8.8	<0.05
	07/01/05	1100	16	51	17	0.13	<0.05	<0.10	<0.05	0.13	<0.20	7.8	<0.05
	10/20/05	1035	16	53	16	0.2	<0.05	<0.10	<0.05	0.11	<0.20	7.0	<0.05
GW-2	07/11/02	1200	30	23	3.3	0.05	<0.05	<0.10	<0.05	<0.03	<0.20	6.6	<0.05
	11/05/02	0830	33	28	<2.0	0.66	<0.05	<0.10	<0.05	<0.03	<0.20	5.6	<0.05
	07/01/05	1200	25	24	2.6	<0.0	<0.05	<0.10	<0.05	<0.03	<0.20	4.2	<0.05
	10/20/05	0830	10	34	7.7	0.62	<0.05	<0.10	<0.05	0.06	<0.20	24	<0.05
GW-3	07/11/02	1000	11	40	3.6	0.35	<0.05	<0.10	<0.05	0.04	<0.20	23	<0.05
	11/05/02	1155	12	39	<2.0	0.95	<0.05	0.099	<0.05	0.045	<0.20	29	<0.05
	07/01/05	*	*	*	*	*	*	*	*	*	*	*	*
	10/20/05	1155	9.8	40	3.6	0.46	<0.05	0.099	<0.05	0.046	<0.20	19	<0.05
GW-4	07/11/02	1015	9.1	19	5.4	0.14	<0.05	<0.10	<0.05	<0.03	<0.20	16	<0.05
	11/05/02	1315	3.6	8.4	<2.0	1.6	<0.05	3.9	<0.05	0.031	<0.20	50	0.15
	07/01/05	1420	2.9	8.4	<2.0	1.2	<0.05	<0.10	<0.05	<0.03	<0.20	49	<0.05
	10/20/05	1315	4.4	15	1.9	1.1	<0.05	3.9	<0.05	<0.02	<0.20	39	<0.05
GW-5	07/11/02	*	*	*	*	*	*	*	*	*	*	*	*
	11/05/02	*	*	*	*	*	*	*	*	*	*	*	*
	07/01/05	*	*	*	*	*	*	*	*	*	*	*	*
	10/20/05	1420	17	37	2.7	0.17	0.01	<0.10	<0.05	<0.02	<0.20	6.1	<0.05

SW-6 Kelsey Creek near Kelseyville
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* Data not reported.

Except for 2001 when monitoring was not done, local wildlife usage of watering basins through 2002 has occurred (BRPC 2003). Because animals need to drink water to live, the watering basins are beneficial. This is particularly true in regions like The Geysers Geothermal Resource Area where the annual source of water is from winter rains. The long hot dry summers leave little in the way of available water for wildlife. Access to what water is available may be impeded by development like the power plant because the facility and the associated fencing create an impediment to terrestrial animals. The water basins mitigate this intrusion on the landscape. The watering basins should be maintained in working order. Monitoring for damage or failure of the watering basins should be done annually, but monitoring for use by wildlife need only be done biennially.

Deer use in black oak and chaparral study areas as determined by pellet counts, has steadily declined from an annual average of 71.0 to 5.9 days in the black oak area from 1981 to 2002 and from an average of 92.0 to 18.3 days in the chaparral area from 1981 to 2000 (BRPC 2003). In the chaparral, the low use trend could be the result of this plant community aging into a mature stage. In addition a general population decline could be related to other factors in the region. Continued monitoring of these study areas is not considered necessary. Also, vegetation and bird monitoring in these areas can be discontinued because the habitat visually appears to have matured and become relatively stable since it was first disturbed in the early 1980's. No dramatic change in the flora or bird fauna is anticipated under proposed project operations.

Soil erosion monitoring should be continued annually to detect any problems related to operation and maintenance so that corrective action can be taken to minimize the potential for impacts within associated drainages. This would entail regular visual inspections and documentation. Monitoring wildlife use of the revegetated cut and fill slopes will not be necessary, so long as acceptable restoration efforts are undertaken in response to incidental erosion problems.

Overall, refurbishing the Bottle Rock Power Plant for restart and operation will not likely have significant impacts on biological resources. However, various monitoring activities during operation and maintenance are necessary to ensure future potential project related impacts will be avoided and/or minimized to acceptable levels.

Conclusions and Recommendations

Staff concludes that the Bottle Rock Geothermal Power Plant can comply with all state, federal, and local laws, ordinances, regulations, and standards, if staff's proposed mitigation and monitoring requirements are fully implemented.

Staff recommends adoption of the proposed conditions with approval of the petition to amend the final decision for the Bottle Rock Power Plant.

Mitigation Measures and Conditions

Except for the headings "Biological Resources" and "Verification", and "5.B - Requirements" below, deleted text from the 1993 Order is shown in ~~strikethrough~~ and added text from the 1993 Order is underlined. Staff proposed reactivation of Conditions 5-1.a. through 5-1.h., is shown in plain text. New deleted text is shown as ~~double strikethrough~~ and new added text is shown as double underline.

Sensitive Species Protection

5-1.a. ~~DWR~~ ~~The project owner will shall~~ have a qualified botanist identify, map, and field mark populations of Napa lomatium (Lomatium repostum) and Brandegee's eriastrum (Eriastrum brandegeeeae) in the vicinity of the power plant, transmission lines, and access roads prior to new ground disturbing activities related to power plant and ancillary facility operation and maintenance. ~~Construction crews~~ Power plant employees, as well as other individuals conducting business on behalf of the project owner, where the work performed is in close proximity to any marked populations, will shall be alerted to avoid those marked populations. No disturbance shall occur to these populations.

Verification: The project owner shall include the results of field marking activities as well as what was done to alert appropriate individuals involved with the project and incorporate this into the BRMMSR. (See 5-3.i. below)

Biological Resources Mitigation Implementation and Monitoring Program

5-1.b. ~~DWR~~ ~~The project owner will shall~~ prepare a revised detailed Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP) which includes mitigation measures with their implementing methodologies, ~~a field implementation plan~~ and submit it to the CEC staff CPM for review and approval in consultation with the California Department of Fish and Game (CDFG). ~~This plan will include the mitigation measures set forth in the AFC (pages V-108 to V-115), excluding brush piles, (V-102) and in the NOI (pages V-16 and 17 and V11-14 and 15).~~ ~~DWR~~ ~~The project owner will shall~~ implement the approved biological resources mitigation and monitoring measures specified in the approved BRMIMP.

Verification: The project owner shall submit the plan to the CEC CPM for review and approval 45 calendar days before the start of electrical power production.

~~5-1.c. The DWR will have erosion controls for all disturbed areas in place prior to the first rain season following construction activities.~~

~~5-1.d. DWR will monitor streams (four locations, see AFC, page V-97) establishing baseline data prior to construction activities. (This requirement will be satisfied if the cooperative Geysers-KGRA aquatic study has commenced by this time.)~~

Habitat Protection Measures and Action Monitoring

~~5-1.e. DWR will~~ The project owner shall submit develop procedural guidelines describing erosion control measures for earthmoving activities that could take place during operation and maintenance which are proposed for the months of November, December, January, February, and March. The CEC CPM staff will review the plan for adequacy and provide a determination of acceptability within 15 21 calendar days of receipt. The plan must be approved prior to allowing earthmoving activities during these months. If earthmoving activities are planned from November to April to November, temporary measures will best management practices acceptable to the CEC CPM for this normally drier period shall be described implemented to control erosion as set forth in the procedural guidelines specified above and incorporated into the BRMIMP AFG (page V-101101 to V-104). (See 5-1.b. above)

Verification: The project owner shall incorporate the procedural guidelines describing the erosion control measures into the BRMIMP after approval by the CEC CPM.

Erosion Control Monitoring for Habitat Protection

~~5-1.f. Annually, in April, DWR will the project owner shall inspect, cut and fill slopes and other all previously disturbed areas for impacts from gully erosion and will soil erosion impacts and shall take corrective action whenever wherever necessary and report to the CEC CPM on this until permanent vegetation and/or successful soil stabilization, as determined by the CEC CPM, is established. At the time soil stabilization has been judged successful by the project owner, the CEC CPM may be contacted to consider terminating or appropriately modifying aspects of this mitigation and monitoring requirement. permanent vegetation is established, DWR will contact CEC staff to consider termination of this aspect of the monitoring program.~~

Verification: The project owner shall submit to the CEC CPM in the BRMMSR the results of the monitoring and an explanation that verifies compliance with this condition. (See 5-3.i. below)

~~5-1.g. DWR will conduct visual observations and infrared aerial photography prior to power plant operation in order to establish a baseline against which cooling tower drift impacts will be evaluated. Following power plant operation, DWR will monitor the potential drift impact area. Monitoring is required for at least the first three years of plant operation at which time DWR, CDFG, and CEC staff will meet to determine if further monitoring is necessary. If significant damage or changes are observed, DWR, CDFG, and CEC staff will decide on further studies and/or necessary mitigation measures.~~

~~5-1.h. If the CEC staff receives any submittals, complaints, or other information from DWR, other agencies or the public that indicates one or more significant impacts are occurring on the leasehold, the Applicant and CEC staff will meet to~~

~~determine what further measures shall be taken to correct or reverse these impacts.~~

~~**Verification:** DWR will prepare annual compliance statements, verifying compliance with the biological resource mitigation measures and implementation schedule. These statements will be submitted to CEC staff.~~

~~Upon reasonable notice, provide access to CEC staff and CDFG staff will be allowed to make on-site inspections.~~

~~With respect to the overall implementation, if any specific mitigation measure or monitoring program is not implemented, is done incorrectly, or is determined to be ineffective, DWR, in consultation with CEC and CDFG, will take action to correct the problem. If the problem cannot be resolved by staff, the compliance monitoring dispute resolution process will be utilized.~~

Closure Plan - Biological Resources Element

- 5-2. One year prior to power plant deactivation, ~~DWR~~ the project owner will shall include in the decommissioning plan a biological resources element identifying mitigation ~~and compensation~~ measures.

~~**Verification:** DWR~~ The project owner will shall submit the biological resources element of the decommissioning plan to the CEC CPM ~~and the CDFG~~ for a determination in consultation with CDFG of adequacy and acceptability.

Protection of Vegetation from Boron Deposition and Uptake

- 5-3.a. If, based on quarterly visual inspections by a qualified individual(s) provided by the project owner, or information provided by other sources indicating that project related drift or emissions may be affecting vegetation in the vicinity of the project, T the project owner DWR shall resume continue annual soil/duff monitoring and leaf tissue analysis to determine boron levels, until the DWR and CEC determine that no further contamination or cumulative impacts remain. The monitoring protocol employed shall be approved by the CEC CPM.

~~**Verification:** The DWR shall project owner shall~~ submit to the CEC CPM by December 15, 1993 and each subsequent year, an annual monitoring report which contains include the results and a discussion of the year's required monitoring in the BRMMSR, and verifies compliance with the condition. (See 5-3.i. below)

Protection of Local Surface Water Quality/Aquatic Habitat

- 5-3.b. The ~~DWR~~ project owner will shall continue surface water sampling at the following 5 sites: Kelsey Creek immediately upstream of the confluence with Alder Creek; Kelsey Creek 500 feet downstream of its confluence with High

Valley Creek; Alder Creek immediately upstream of its confluence with Kelsey Creek; High Valley Creek immediately upstream of its confluence with Kelsey Creek; and Kelsey Creek near Kelseyville.

Sampling shall be conducted ~~four times a year~~, in January, April, July, and October of each year.

Protocol: Each surface water sample shall be analyzed for boron, sodium, sulfate, calcium-magnesium hardness, Ph, alkalinity, settleable solids, non-filterable residue, turbidity, ~~and~~ specific electrical conductivity, magnesium, calcium, copper, iron, lead, manganese, and zinc.

Additionally, As determined necessary by the CEC CPM, based on water quality sampling results and consultation with the CDFG, the DWR will project owner shall, during April, July and October, collect and identify bottom-dwelling organisms from at least one square meter of stream-bed at each site and make special trace metal determinations for copper, iron, manganese, lead and zinc.

Verification: The DWR project owner shall submit to the CEC CPM by December 15, 1993 and each subsequent year, an annual monitoring report which contains include the results and a discussion of the year's monitoring in the BRMMSR and verifies compliance with the condition. (See 5-3.i. below)

Protection of Local Groundwater

5-3.c. The DWR project owner shall continue groundwater sampling at the following five sites: Nance Spring, Union Oil Spring, Coleman Well, Jadiker Spring and Francisco Well.

Sampling shall be conducted ~~four times a year~~, in January, April, July, and October of each year.

Protocol: Each groundwater sample shall be analyzed for boron, sodium, sulfate, calcium-magnesium hardness, pH, alkalinity, non-filterable residue, specific electrical conductivity, copper, iron, manganese, lead and zinc.

Verification: The DWR project owner shall submit to the CEC CPM by December 15, 1993 and each subsequent year, an annual monitoring report which contains include the results and a discussion of the year's monitoring in the BRMMSR and verifies compliance with the condition. (See 5-3.i. below)

Mitigation for Loss of Habitat for Hole Nesting Birds

5-3.d. The DWR project owner shall replace and maintain the nest boxes as originally prescribed, and maintain wildlife water basins in working condition. Wildlife use of these habitat improvement projects ~~will~~ shall be monitored

annually ~~biennially~~ using the same methodology that has been used in the past and thoroughly described in the BRMMSP. (See 5-3.i. below)

Verification: ~~The DWR project owner shall submit to the CEC CPM by December 15, 1993 and each subsequent year, an annual monitoring report which contains include the results and a discussion of the year's biennial monitoring in the BRMMSR and verifies compliance with the condition. (See 5-3.i. below)~~

~~5-3.e. Deer pellet group counts shall be sampled by the DWR every 6 months, using the same methodology as in past sampling. (See 5-3.i. below)~~

Verification: ~~The DWR shall submit to the CEC CPM by December 15, 1993, and each subsequent year, a report which contains the results and a discussion of the monitoring and verifies compliance with the condition.~~

~~5-3.f. Vegetation (quantity and species composition) monitoring shall be continued by the DWR on the two 25 acre study plots twice in the next ten years.~~

Protocol: ~~Once during the first five year interval and once during the second five year interval. The same methodology will be used as in the past for monitoring of these plots. (See 5-3.i. below)~~

Verification: ~~The DWR shall submit a report to the CEC CPM by December 15th of the year of the monitoring action, which contains the results and a discussion of the monitoring and verifies compliance with the condition.~~

~~5-3.g. Bird monitoring in the black oak and chaparral study areas shall be conducted three times in the next 10 years by the DWR. This monitoring will use the same methodology (See 5-3.i. below) as past monitoring of these study areas. Monitoring will be spread over the ten year period.~~

Verification: ~~The DWR shall submit to the CEC CPM by December 15th of the year of the monitoring action, a report which contains the results and a discussion of the monitoring and verifies compliance with the condition.~~

Erosion Control Monitoring for Watershed Protection

~~5-3.h. DWR The project owner shall monitor erosion on an on-going basis during the rainy season. Inspections shall include all cut and fill slopes and other disturbed areas. Erosion problems shall be immediately repaired.~~

~~If temporary repairs are necessary during the rainy season, DWR the project owner shall complete permanent repairs to those erosion problems by October 10th of each year.~~

Verification: ~~The DWR project owner shall submit to the CEC CPM by August 15th of each year an annual report which includes results of erosion~~

monitoring when erosion problems are discovered. This report will describe the problems discussed and action taken to correct the problems.

During years when no erosion problems occur, and no corrective action is required, a brief discussion may be included and submitted in the December 15th annual report. (See 5-3.i. below)

Status Reporting for Mitigation and Monitoring

5-3.i. A Biological Resources Mitigation and Monitoring and Mitigation Status Report (BRMMSR) shall be prepared to provide the results of the previous year's monitoring. This report ~~will~~ shall be submitted by December 15th each year. The ~~1993~~ report will collate and summarize all monitoring results including methodologies used to satisfy conditions 5-3.a.b. through 5-3.h. The project owner shall include in the BRMMSR appropriate maps of suitable scale with a detailed discussion of the current status of all mitigation and monitoring actions.

Verification: The ~~DWR~~ project owner shall submit to the CEC CPM by December 15th, ~~1993~~, and of each ~~subsequent~~ year, an annual BRMMSR which verifies compliance with the Biological Resource Conditions of Certification.

Upon reasonable notice the CEC CPM, Lake County staff, the Regional Water Quality Control Board staff, and the California Department of Fish and Game (CDFG) staff, shall be granted access for inspections.

Compliance Response to Mitigation and Monitoring Deficiencies

5-3.j. If any specific mitigation measure or monitoring program is determined to be ineffective, or if the CEC CPM staff receives any submittal, complaints, or other information from the ~~DWR~~ project owner, other agencies, or the public, that indicates one or more significant impacts are occurring on the leasehold subject to CEC jurisdiction, ~~DWR~~ the project owner shall undertake actions and the CEC staff CPM shall meet to determine what further measures shall be taken to correct or reverse these impacts with advice and consent from the CEC CPM.

Verification: The ~~DWR~~ project owner in consultation with CEC CPM will take action to correct the problem. If the problem cannot be resolved ~~by staff~~, the compliance monitoring dispute resolution process will be utilized.

~~5-4. Monitoring of wildlife use of the revegetated cut and fill slopes shall be initiated and conducted by the DWR three times, spread throughout the next 10 years. This effort will include: birds; deer; reptiles; small mammals; and~~

~~rabbits/hares. DWR shall develop a methodology and a proposed schedule for these monitoring studies.~~

~~**Verification:** DWR shall submit the methodology and a proposed schedule for these monitoring studies to the CEC CPM for acceptability, 60 days prior to the start of monitoring during the first monitoring year.~~

~~The CEC CPM will respond as to the acceptability of the methodology and the monitoring schedule within 30 days of receipt of the submittal.~~

~~Filing of the subsequent three reports and all status reports will be included in the December 15 annual BRMMR (5-3.i.).~~

REFERENCES

- BRPC 2003. Bottle Rock Power Plant and Steamfield Annual Compliance Monitoring Report -2002. Prepared by EGS Inc for Bottle Rock Power Corporation. June 2003.
- BRPC 2006. Bottle Rock Power Plant and Steam Field Annual Compliance Monitoring Report -2005. Prepared by EGS Inc for Bottle Rock Power Corporation. February 2006.
- CNDDDB. 2006. California Department of Fish and Game. Natural Diversity Data Base. 1416 9th St., 12th Floor, Sacramento, CA 95814. (916) 324-3812. Version July, 29, 2006.
- DWR 1993. Vegetative Response to Geothermal Drift at the Bottle Rock Geothermal Power Plant 1984-1992. State of California, The Resources Agency, Department of Water Resources, Northern District. Technical Information Record. May 1993.
- DWR 1994. Annual Compliance Monitoring Report for the Bottle Rock Geothermal Power Plant January 1, 1994 – December 31, 1994. State of California, The Resources Agency, Department of Water Resources, Northern District.
- Karfiol, R.C., and L.E. McMillan, eds. 1983. Geysers-Calistoga KGRA-ARM Program 1981-1982 annual report. 2 vols.
- McMillan, L.E. (Ed.) 1985. Geysers-Calistoga KGRA-ARM Program 1982-1983 annual report. 2 vols.
- Suess, R.E. 2006. Record of Conversation, Ronald E. Suess, JD. President – Bottle Rock Power Corporation. 1275 4th Street, No. 105, Santa Rosa, CA 95404. 707-541-0976.

Bottle Rock Geothermal Power Project (79-AFC-4C)
Petition to Change the Ownership to Bottle Rock Power, LLC (BRP), Amend the Decision
to Allow the Restart of Operation, and Complete 11 Minor Design Changes
Administrative Changes
Prepared by Christopher Meyer
October 2, 2006

The following proposed revisions to the Conditions of Certification for the Bottle Rock Geothermal Power Project will reactivate Conditions of Certification that were suspended in the 1993 Order and replace references to the former project owner, DWR (California Department of Water Resources) with the term "project owner" and "CEC staff" with "CEC CPM" to reflect current administrative terminology. Text deleted in the 1993 Order to suspend certain Conditions of Certification is shown by a ~~single strikethrough~~, and new text introduced in the 1993 Order is shown by a single underline. Proposed changes in the current Staff Analysis are shown by double underline for additional text and by ~~double strikethrough~~ for deleted text. Conditions of Certification that staff proposes to reactivate are shown in plain text, but noted in the introduction of each section.

Public Health

The Public Health section was reviewed by Energy Commission staff. Staff recommends reactivating suspended original Conditions 2-1 through 2-9, with administrative changes in the ownership name and the timing of some submittals. In consultation with Dr. Alvin Greenburg, PhD., staff recommends the addition of Condition of Certification 2-10 to address current public health concerns as discussed below.

In addition to being a source of potential toxic air contaminants, the possibility exists for bacterial growth to occur in the cooling tower, including Legionella. Legionella is a bacterium that is ubiquitous in natural aquatic environments and is also widely distributed in man-made water systems. It is the principal cause of legionellosis, otherwise known as Legionnaires' Disease, which is similar to pneumonia. Transmission to people results mainly from inhalation or aspiration of aerosolized contaminated water. Untreated or inadequately treated cooling systems, such as industrial cooling towers and building heating, ventilating, and air conditioning systems, have been correlated with outbreaks of legionellosis.

Legionella can grow symbiotically with other bacteria and can infect protozoan hosts. This provides Legionella with protection from adverse environmental conditions, including making it more resistant to water treatment with chlorine, biocides, and other disinfectants. Thus, if not properly maintained, cooling water systems and their components can amplify and disseminate aerosols containing Legionella.

As noted in the LORS section above, the State of California regulates recycled water for use in cooling towers in Title 22, Section 60303, California Code of Regulations. This

section requires that, in order to protect workers and the public who may come into contact with cooling tower mists, chlorine or another biocide must be used to treat the cooling system water to minimize the growth of Legionella and other micro-organisms. Legionella is not regulated by the LCAQMD but Energy Commission staff suggests that facilities follow guidelines and recommendations made by the Cooling Technology Institute (CTI) in their February 2000 report titled "Legionellosis, Guideline: Best Practices for Control of Legionella" (CTI 2000).

The U.S. EPA published an extensive review of Legionella in a human health criteria document (EPA 1999). The U.S. EPA noted that Legionella may propagate in biofilms (collections of microorganisms surrounded by slime they secrete, attached to either inert or living surfaces) and that aerosol-generating systems such as cooling towers can aid in the transmission of Legionella from water to air. The U.S. EPA has inadequate quantitative data on the infectivity of Legionella in humans to prepare a dose-response evaluation. Therefore, sufficient information is not available to support a quantitative characterization of the threshold infective dose of Legionella. Consequently, the presence of even small numbers of Legionella bacteria are presumed to present a risk, however small, of disease in humans.

In 2000 as noted above, the CTI issued its own report and guidelines for the best practices for control of Legionella (CTI 2000). The CTI found that 40-60 percent of industrial cooling towers tested were found to contain Legionella. More recently, staff has received a 2005 report of testing in cooling towers in Australia that found the rate of Legionella presence in cooling tower waters to be extremely low, approximately three to six percent. The cooling towers all had implemented aggressive water treatment and biocide application programs similar to that required by proposed condition of certification 2-10.

To minimize the risk from Legionella, the CTI noted that consensus recommendations included minimization of water stagnation, minimization of process leads into the cooling system that provide nutrients for bacteria, maintenance of overall system cleanliness, the application of scale and corrosion inhibitors as appropriate, the use of high-efficiency mist eliminators on cooling towers, and the overall general control of microbiological populations.

Good preventive maintenance is very important in the efficient operation of cooling towers and other evaporative equipment (ASHRAE 1998). Preventive maintenance includes having effective drift eliminators, periodically cleaning the system if appropriate, maintaining mechanical components in working order, and maintaining an effective water treatment program with appropriate biocide concentrations. Staff notes that most water treatment programs are designed to minimize scale, corrosion, and biofouling and not to control Legionella.

The efficacy of any biocide in ensuring that bacterial and in particular Legionella growth, is kept to a minimum is contingent upon a number of factors including but not limited to proper dosage amounts, appropriate application procedures and effective monitoring.

In order to ensure that Legionella growth is kept to a minimum, thereby protecting both nearby workers as well as members of the public, staff has proposed Condition of Certification 2-10. The condition would require the project owner to prepare and implement a biocide and anti-biofilm agent monitoring program to ensure that proper levels of biocide and other agents are maintained within the cooling tower water at all times, that periodic measurements of Legionella levels are conducted, and that periodic cleaning is conducted to remove bio-film buildup. Staff believes that with the use of an aggressive antibacterial program coupled with routine monitoring and biofilm removal, the chances of Legionella growing and dispersing would be reduced to an insignificant level.

2-1. ~~DWR~~ The project owner shall conduct quarterly sampling and analysis for radon-222 concentrations in noncondensable gases entering the power plant. An outline of the current California Department of Health Services Radiologic health Section (CDHS/RHS) minimal requirements for monitoring and reporting on radon-222 follows:

- The facility must be sampled at least quarterly.
- The sampling and analysis methods must be shown to be accurate by comparison to known standards supplied by an acceptable source (e.g., EPA). This "standard comparison" or "calibration" shall be run with each set of samples counted unless it is shown that the counting system is sufficiently stable. If calibration is unnecessary for each run, then calibration shall be required at least once per year.
- Each power production unit must be sampled such that the instantaneous radon-222 emission rate (Ci/sec) to the environment is accurately determined.

This radon-222 monitoring program will be conducted for at least the first three years of commercial operation. If monitoring results indicate that the radon-222 release for the Bottle Rock facility is well within applicable standards, the program may be modified, reduced in scope, or eliminated, provided the approval of CDHS/RHS is obtained by ~~DWR~~ the project owner. As new information and techniques become available, with concurrence of ~~DWR~~ the project owner and CDHS/RHS, changes may be made to the program or the methods employed in monitoring radon-222.

Verification: Approximately 10 percent of samples will be taken in duplicate, with the duplicate sample sent to the CDHS Sanitation and Radiation Laboratory in Berkeley for cross-check analysis as a quality control on ~~DWR's~~ the project owner's laboratory analyses.

~~DWR~~ The project owner will provide annual reports to CDHS/RHS discussing each point above. All results shall include the standard deviation associated with

the counting error. Sources of error in the sampling procedure and emission calculation shall be discussed.

The report shall also indicate the maximum dose due to emissions calculated at the site boundary, and to the resident nearest the location of maximum radon-222 concentration, and the resultant expected population dose. (These dose calculations may follow a simplified methodology established by CDHS/RHS.)

Annual reports shall be maintained by CDHS/RHS and be available to the CEC and the public on request. CDHS/RHS shall report annually the results of the radon-222 monitoring program to the CEC. This report shall include, at a minimum, data concerning average and high values of radon-222 emissions and incidences of the 3.0 pCi/l and 6.0 pCi/l level exceedances (see 2-2. and 2-3. below).

If the program is modified, reduced in scope, or eliminated, ~~DWR~~ The project owner shall send a copy of CDHS/RHS approval to the CEC CPM.

- 2-2. If the radon-222 concentration exceeds 3.0 picocuries per liter (pCi/l) in the cooling tower exhaust, ~~DWR~~ the project owner must inform the CDHS/RHS and CEC ~~staff~~ CPM with a special report within 30 days of confirming an exceedance.

Verification: ~~DWR~~ The project owner shall provide a written report to CDHS/RHS and CEC ~~staff~~ CPM of sample results within 30 days of confirming an exceedance of 3.0 (pCi/l) radon-222 in the cooling tower exhaust. Confirmation includes the reanalysis of the sample by ~~DWR~~ the project owner or another qualified laboratory. Confirmation of sample results must be accomplished in the most expedient manner possible. The procedures used shall be the same as the normal analysis but may include sending samples to CDHS/RHS and/or outside qualified laboratories for analysis. The confirmation of a sample should take less than five calendar days. ~~DWR~~ The project owner shall notify the CEC of corrective actions taken.

- 2-3. If the radon-222 concentrations exceed 6.0 pCi/l in the cooling tower exhaust, ~~DWR~~ the project owner shall notify the CDHS/RHS and the CEC by email telegram or telephone within 24 hours of upon confirmation of the sample result.

Verification: ~~DWR~~ The project owner shall notify CDHS/RHS and the CEC within 24 hours of confirming the sample results. (See 2-2. above for confirmation requirements.) ~~DWR~~ The project owner shall notify the CEC of corrective actions taken.

- 2-4. ~~DWR~~ The project owner shall obtain baseline ambient air measurements for benzene, silica, mercury, arsenic, ammonia, and vanadium in accordance with the following requirements. These requirements may be accommodated as a part of any established regional data-gathering program acceptable to LCAPCO and CEC staff.

- Measurements shall be made in the populated areas in Cobb Valley downwind of the power plant, to be determined by LCAPCO, CEC staff, and ~~DWR~~ the project owner. Sampling will be performed for at least one year prior to commercial operation.
- Mercury will be measured in the particulate and vapor state.
- Benzene will be measured in the vapor state.
- Particulate measurements for silica, arsenic, mercury, and vanadium will be made using a sampler for inhalable particulates. Elemental analyses may be performed using particle induced X-ray emission (PIXE) techniques, atomic absorption or neutron activation techniques. Particulate samples will be collected every sixth day on the same schedule as the California Air Resources Board (CARB) statewide hi-vol particulate monitoring.
- Mercury vapor measurements will be made by trapping the vapor and subsequent laboratory analysis. The schedule for mercury vapor sampling may differ from the particulate sampling depending on the exact method used. Ammonia will be measured in the gaseous state concurrently with hydrogen sulfide. If a uniform ratio exists between ammonia and hydrogen sulfide, ambient hydrogen sulfide data can be used to estimate ammonia concentrations.

Ammonia measurements will be performed using a continuous NO-N02 analyzer retrofitted with a high temperature converter designed for ammonia determination.

Measurement methods other than those specified above may be proposed and used by ~~DWR~~ the project owner as pre-approved by the CEC staff.

Verification: A sampling plan consistent with the above sampling requirements will be prepared by ~~DWR~~ the project owner for approval by the CEC staff and LCAPCD, in consultation with the CARB, and CDHS, 120 days before monitoring begins. ~~DWR~~ The project owner shall provide the LCAPCD, CARB, and CEC with quarterly reports summarizing the monitoring results.

- 2-5. ~~DWR~~ The project owner and CEC staff, in consultation with CARB and CDHS, will agree upon significant levels of regulated and nonregulated pollutants applicable in the operational monitoring program. (Significant levels for regulated pollutants will be revised only if there is change in federal or state air quality standards.)

Verification: CEC staff shall prepare a report on the agreed upon levels for pollutants. This report will be filed with CEC CPM.

- 2-6. For the first two years of operation, ~~DWR~~ the project owner shall analyze the incoming steam to the power plant for mercury, arsenic, silica, boron, benzene, and ammonia. These components shall be monitored every quarter.

Verification: ~~DWR~~ The project owner shall submit the monitoring program plan to LCAPCD, CEC CPM, and CARB. LCAPCD shall review the plans for adequacy. ~~DWR~~ The project owner shall submit test results to the LCAPCD and the CEC on a quarterly basis. After two years, the LCAPCD shall determine if annual testing for the above-mentioned steam constituents is sufficient. ~~DWR~~ The project owner may join with the steam supplier in performing such tests.

- 2-7. In the second year of commercial operation, ~~DWR~~ the project owner shall perform a mass balance measurement for mercury and arsenic.

Verification: ~~DWR~~ The project owner will prepare a report on the mass balance measurements and calculations. ~~DWR~~ The project owner shall send the report to the CDHS and CEC CPM within 30 days after completing the measurements. The program results will be evaluated by CEC CPM and CDHS to determine requirements, if any, for continuation of a mass balance measurement program.

- 2-8. New well steam analysis will be performed by ~~DWR~~ the project owner when new steam supply wells are added to guarantee that combined power plant emission (the sum of base line, power plant contributions and new well contributions) do not change significantly (+20 percent). Methodology for this analysis will be the same as in 2-6. above.

Verification: ~~DWR~~ The project owner shall send the new well steam analysis to the CEC within 30 days after the sampling.

- 2-9. ~~DWR~~ The project owner shall conduct ambient air monitoring for arsenic, boron, mercury, benzene, and silica for one year after initial operation, as outlined in LCAPCD's Determination of Compliance, Condition 22. At the end of the indicated period, LCAPCD will review the monitoring program and determine the feasibility and necessity for continuing the program. If ~~DWR~~ the project owner enters into a combined monitoring program with other developers that is acceptable to the LCAPCD and CEC, this requirement would be satisfied.

Verification: ~~DWR~~ The project owner shall submit the monitoring plan to LCAPCO, CEC, and CARB for approval at least six months prior to start-up of the program. ~~DWR~~ The project owner shall provide the LCAPCO, CARB, and CEC CPM with quarterly reports summarizing the monitoring results.

- 2-10 The project owner shall develop and implement a Cooling Water Management Plan to ensure that the potential for bacterial growth in cooling water is kept to a minimum. The Plan shall be consistent with either staff's "Cooling Water Management Program Guidelines" or with the Cooling Technology Institute's

"Best Practices for Control of Legionella" guidelines but in either case, the Plan must include sampling and testing for the presence of Legionella bacteria at least every six months. After two years of power plant operations, the project owner may ask the CEC CPM to re-evaluate and revise the Legionella bacteria testing requirement.

Verification: At least 60 days prior to the restart of cooling tower operations, the Cooling Water Management Plan shall be provided to the CEC CPM for review and approval.

Socioeconomic/Aesthetics

The Socioeconomic/Aesthetics section was reviewed by Energy Commission staff and there are no recommended changes other than the administrative changes in the ownership name and reactivating suspended original Condition 3-1. Original Condition 3-2 shall remain in effect.

- 3-1** ~~DWR~~ The project owner shall prepare a detailed visual impacts mitigation plan. The plan will discuss the specific steps to be undertaken in order to carry out the mitigation measures identified in the Draft EIR (page 142). This plan may be submitted as a part of the biological resource mitigation plan. If this is done, the joint plan must be identified as such and must specify how the measures are intended to mitigate the visual disturbances of the project. In addition to onsite impacts, the visual impacts mitigation plan shall include measures for the visual disturbances associated with the access roads and transmission lines.

Verification: ~~DWR~~ the project owner shall submit the visual impacts mitigation plan to the CEC CPM by January 16, 1981 for review and approval. The CEC staff, in consultation with the Lake County Planning Department, shall review the plan.

- 3-2.** ~~DWR~~ The project owner shall not begin construction activities without CEC approval of the visual impacts mitigation plan. ~~DWR~~ The project owner shall implement the mitigation measures identified in the approved plan. ~~DWR~~ The project owner shall also implement any subsequent mitigation measures which may be approved by the CEC CPM in the event that measures included in the approved visual impacts mitigation plan are not sufficient to alleviate the visual disturbances.

Verification: ~~DWR~~ The project owner shall submit an annual report to the CEC CPM demonstrating compliance with the applicable requirements of the visual impacts mitigation plan, including any subsequent amendments.

Cultural Resources

The Cultural Resources section was reviewed by Energy Commission staff, and there are no recommended changes other than the administrative changes in the ownership name and reactivating suspended original Conditions 4-1 through 4-4. No changes to modified Condition 4-5.

- 4-1. ~~DWR~~ The project owner shall develop and implement a systematic archaeological recovery program for site CA-LAK-610 in consultation with CEC staff prior to any construction activity. The program shall include the development of an archaeological research design, site mapping, and a site transect for sampling. The program shall also provide for the analysis and curation of recovered artifacts.

Verification: ~~DWR~~ The project owner shall provide the CEC CPM with a copy of the archaeological recovery program plan.

- 4-2. ~~DWR~~ The project owner shall arrange for the presence of a qualified archaeologist to advise ~~DWR's~~ The project owner ~~Construction Department~~ of the significance of any cultural resource which may be discovered during the stripping of vegetation and top soil from the plant site and related facilities.

The archaeologist shall conform to on-site safety procedures, as directed by the project owner ~~Resident Engineer~~.

Verification: The presence of the archaeologist shall be noted in the monthly Construction Progress Report provided the CEC CPM.

- 4-3. If previously unidentified cultural resource sites are discovered or unearthed during construction, work in the immediate area will be halted until the archaeologist evaluates the significance of the resource. If the resource is determined to be significant, ~~DWR~~ the project owner shall promptly notify the CEC CPM of the resource discovery and work stoppage. Representatives of ~~DWR~~ the project owner, the CEC CPM, and the Anthropology Lab at Sonoma State University shall meet with ~~DWR's~~ the project owner's archaeologist within one working day of the notification to discuss the possible mitigation measures. Pending resolution of this matter, construction activity in the resource area shall remain stopped.

Verification: ~~DWR~~ The project owner shall notify the CEC CPM within one working day of the resource discovery and the work stoppage.

- 4-4. ~~DWR~~ The project owner shall ensure that construction personnel are instructed to avoid all contact with flagged or fenced sites and to avoid disturbance of any other historic or archaeological material.

Verification: Prior to the start of construction activities, ~~DWR~~ the project owner shall provide the CEC CPM with a statement verifying compliance.

- 4-5. ~~DWR~~ Project owner shall ensure that the existing fence on the north side of site CA-LAK-609 is maintained.

Verification: A statement verifying compliance shall be provided in each Annual Compliance Report filed with the CEC CPM.

Water Quality/Water Resources

The Water Quality/Water Resources section was reviewed by Energy Commission staff, and there are no recommended changes other than the administrative changes in the ownership name and clarification of the reporting requirements in the Verification section of Condition 6-5. No changes to modified Conditions 6-1 through 6-4 or 1993 issued Conditions 6-5 and 6-6.

- 6-1. ~~DWR~~ Project owner shall, during any ~~the~~ period of suspension, utilize no new surface water as the source for any maintenance or other necessary activity without first notifying and obtaining the required authorization from the appropriate federal, state, county or local agencies.

Verification: 90 days prior to proposed use of surface water, ~~DWR~~ the project owner shall file statements with the CEC CPM, the Water Resources Control Board, the Central Valley Regional Water Quality Control Board (CVRWQCB), and all other agencies having regulating jurisdiction over such water use, identifying the source(s), estimated amounts of use, and the method of obtaining such water.

Additionally, ~~DWR~~ the project owner shall provide the CEC CPM copies of all agency responses and permits necessary for surface water use requests.

- 6-2. ~~DWR~~ Project owner shall maintain on file the Spill Contingency and Containment Plan (SCCP) originally required by the CVRWQCB.

Verification: ~~DWR~~ Project owner shall notify the CEC CPM of the file location of the SCCP. ~~DWR~~ Project owner shall comply with all applicable monitoring conditions described in CVRWQCB's Waste Discharge Requirement Order No. 76-202 and any amendments thereto.

- 6-3. ~~DWR~~ Project owner shall adequately maintain the previously constructed impermeable spill collection-containment system to preclude discharges of toxic-hazardous waste and materials from the power plant pad.

Verification: ~~DWR~~ Project owner shall submit annually to the CVRWQCB and to the CEC CPM, via the Annual Compliance Report, a record of maintenance and corrective measures to the spill containment system.

- 6-4. DWR Project owner shall, during ~~any~~ the period of suspension, maintain and operate the domestic waste water septic tank, holding tank, pumps and control system as originally designed to discharge the limited amounts of effluent into the steam suppliers condensate reinjection system.

Verification: DWR Project owner shall submit annually to the CVRWQCB and to the CEC CPM via the Annual Compliance Report, a record of maintenance and operation of the domestic waste water disposal system.

- 6-5. DWR Project owner shall maintain quarterly records of the volume of water pumped from the on-site supply well.

Verification: DWR Project owner shall include in the annual compliance report ~~maintain on site for the CEC CPM to review upon request,~~ supply records of water pumpage from the on-site water well.

- 6-6. To minimize the effects of contaminated storm water runoff discharges from the paved plant site areas to surface waters, DWR project owner shall discharge all such waters to the condensate reinjection well(s), limited only by the capacity of the existing sump pumps or the capacity of the reinjection well(s) to accept such discharges.

Note: During high rainfall periods when the runoff from the paved plant area is discharging to the High Valley Creek watershed, the impacts of such discharges will be minimized due to the diluting effects of runoff from the remainder of the watershed.

Verification: DWR Project owner shall submit annually to the CEC CPM a record of maintenance and operation of the drainage sump pump discharge to the injection well(s).

Geotechnical/Seismic Hazards

The Geotechnical/Seismic section was reviewed by Energy Commission staff, and there are no recommended changes other than the administrative changes in the ownership name and reactivating suspended original Conditions 7-1 through 7-3. No new Conditions issued.

- 7-1. DWR The project owner will assign to the project one or more qualified geotechnical engineers to monitor compliance with design intent in geotechnical matters, to provide consultation during design and construction of the project, to make professional geotechnical judgments concerning actual site conditions and to recommend field changes to the responsible civil engineer. The responsibilities of the geotechnical engineer will include:

- Review of earthwork quality control tests (including compaction tests);

- Reporting to the responsible civil engineer any geologic conditions which differ from those predicted on the basis of the engineering, geology, and soils engineering reports and any site earthwork which does not comply with the approved grading plans and change orders;
- Preparation, in accordance with UBC 7015, of a Soils Grading report with his approval that the site is adequate for the intended use; and
- Other duties (such as monitoring on-site or near-site ground-water levels) as appropriate.

Verification: ~~DWR~~ The project owner shall notify the CEC CPM prior to beginning construction of the geotechnical engineer's name and registration number.

7-2. ~~DWR~~ The project owner will assign to the project a qualified certified engineering geologist who will be present as needed during all phases of site excavation and grading to evaluate site geologic conditions and geologic safety. Responsibilities of the engineering geologist will include:

- Collection during site excavation and trading of information relative to site geology and geologic safety, including inspection and monitoring of drill logs and drill cores;
- Preparation of a detailed permanent geologic map or log of all final excavated surfaces (including walls and floors of the foundations of the turbine generator building, cooling tower, and other permanent structures);
- Reporting to the responsible civil or geotechnical engineer any geologic conditions which differ from those predicted in the Engineering Geology Report; and
- Preparation, in accordance with requirements of UBC Section 7015, of a Geologic Grading Report, with approval that the site is adequate for the intended use as affected by geologic conditions.

Verification: ~~DWR~~ The project owner shall notify the CEC CPM prior to beginning construction of the certified engineering geologist's name and certification number

7-3. Should adverse site conditions warranting substantial changes in facility design or other mitigation measures be discovered during site excavation and grading, ~~DWR's~~ the project owner's evaluation of these conditions shall be signed and stamped by a certified engineering geologist, and any plans setting forth the substantial changes (change orders) shall be signed and stamped by the responsible registered civil engineer, who shall also verify that the change orders

conform with the terms and conditions of the certificate. ~~DWR~~ The project owner shall not proceed with any earthwork in the affected area (except that necessary to protect persons, property, and the environment) based on proposed change orders until the change orders are accepted by CEC staff.

As soon as possible after ~~DWR~~ the project owner confirms the presence of any adverse site conditions which may require substantial changes, ~~DWR's~~ the project owner's civil engineer or geotechnical engineer shall notify the CEC CPM and shall submit to the CEC CPM the new geotechnical information upon which the necessary change orders will be based.

As soon as possible after ~~DWR~~ the project owner has developed change orders for such hazardous or adverse geologic conditions, ~~DWR~~ the project owner will submit two copies of such change orders to the CEC CPM for determination of their acceptability.

Discovery of adverse site conditions which will warrant only minor changes in facility design or other mitigation measures need not be reported by ~~DWR~~ the project owner to the CEC CPM. Such new geotechnical information will be reflected in the as-graded and as-built plans. ~~DWR~~ The project owner will maintain the as-built and as-graded plan files for the life of the project. CEC staff will have access to these files.

"Substantial changes are those changes requiring an alteration in design concept and preparation of new design calculations.

Verification: CEC staff will review the proposed change orders and the geotechnical information on which they are based to determine that they conform with the terms and conditions of the certificate. Unless ~~DWR~~ the project owner is notified otherwise within 30 days of receipt by CEC CPM of any change order, ~~DWR's~~ the project owner's proposed change orders will be deemed acceptable to CEC staff. CEC staff, or its agents, shall give ~~DWR~~ the project owner reasonable notice (at least 24 hours) prior to unscheduled inspections of site earthwork, unless an imminent hazard requires more immediate inspection.

Soils

Reactivate suspended original Conditions 8-1, 8-2, and 8-3. Original Condition 8-4 shall remain in effect. Staff proposes deletion of original Conditions 8-2 and 8-2 as they pertained to a one time event that has been completed. Condition 5-3.h. in the Biological Resources Section, addresses soil erosion issues.

- 8-1. ~~DWR~~ The project owner will adhere to the objectives of the above Water Quality Control Plan (Basin Plan) concerning turbidity and sedimentation related to construction projects.

Verification: Immediately following any new construction activity ~~turbine roll,~~ DWR the project owner will file a statement with the Central Valley Regional Water Quality Control Board (CVRWQCB) stipulating the methods employed by DWR the project owner to comply with the above requirement.

- ~~8-2. DWR is to construct a sedimentation containment system of terraced ditched slopes and straw bale barriers, to be effectively maintained until revegetation of the cut and fill slopes becomes stabilized.~~

~~**Verification:** Immediately following construction DWR shall file "as-builts" of the above described system with the CVRWQCB.~~

- ~~8-3. DWR shall annually quantify the amount of sediments removed from the sediment collection system.~~

~~**Verification:** For three years following the commencement of commercial operation, shall annually file a tabulated report to the CVRWQCB and the CEC. This report shall also contain a record of maintenance to the sedimentation collection system, and DWR's proposed corrective measures.~~

- 8-4. Prior to decommissioning of the power plant, DWR the project owner shall prepare site restoration plans and submit them to the CEC CPM for review and approval at least six months prior to scheduled decommissioning.

Verification: At least six months prior to scheduled decommissioning, DWR the project owner shall submit site restoration plans to the CEC CPM for review and approval.

Civil Engineering

The Civil Engineering section was reviewed by Energy Commission staff and there are no recommended changes other than the administrative changes in the ownership name and reactivating suspended original Conditions 9-1 through 9-4. Original Condition 9-5 remains in effect. No new Conditions issued.

- 9-1. At least 30 days prior to submittal of proposed Grading Plans, DWR the project owner shall notify the CEC that the plans will be filed on or about a certain date. At least 60 days prior to intended start of site excavation and grading, DWR the project owner will simultaneously submit proposed Grading Plans to the CEC CPM and the CBO for review.

The CBO will, within 25 days of Grading Plan submittal, file concurrently with DWR the project owner and the CEC CPM, a compliance letter containing the County's review comments.

Verification: The CEC CPM will, within 50 days of receipt by CEC CPM of DWR's the project owner's proposed Grading Plans, file a compliance letter to notify DWR the project owner if the plans are acceptable to CEC staff, or, if not,

of the CEC staff recommendations. Should the CEC CPM fail to file the compliance letter within 50 days, ~~DWR~~ the project owner may deem its proposed Grading Plans acceptable to CEC staff.

- 9-2. Upon submittal by ~~DWR~~ the project owner to the CEC CPM of adequate quality assurance/quality control procedures for inspectors of earthwork and grading, CEC staff may delegate to ~~DWR~~ the project owner responsibility for determining that such work conforms with ~~UBC 79~~ CBSC 2001 or other requirements of the certificate.

Should CEC staff delegate earthwork inspections to ~~DWR~~ the project owner, ~~DWR~~ the project owner will certify that any designated inspectors have the authority to: (a) stop excavation or grading in areas where adverse site conditions are discovered or where earthwork does not conform with the approved grading plans or change orders; and (b) require that changes or remedial work be performed to reestablish conformance or to achieve the design intent.

Verification: The CEC CPM will notify ~~DWR~~ the project owner when the quality assurance/quality control procedures have been determined to be adequate. The CEC staff or its agents, may, upon reasonable notice to ~~DWR~~ the project owner, inspect the site at any time to verify conformance of site earthwork with approved plans and change orders and/or to evaluate newly discovered adverse site conditions.

- 9-3. ~~DWR~~ The project owner shall keep the CEC CPM informed regarding the status of construction through monthly construction status reports.

Verification: ~~DWR~~ The project owner shall submit monthly construction reports to the CEC CPM until the start of commercial operation.

- 9-4. ~~DWR~~ The project owner will notify the CEC CPM when site earthwork is ready for final inspection and, upon completion of the rough grading work and at the final completion of the work, will file with the CEC CPM, two copies of the As-Graded Grading Plan, Soils Engineering Report, and Geologic Grading Report per ~~UBC Section 7015~~ CBSC 2001.

~~DWR's~~ The project owner's responsible civil engineer shall certify on the As-Graded Grading Plan that site earthwork was done in accordance with the final approved grading plan (including change orders) and satisfies the design intent.

Upon completion of site earthwork, ~~DWR~~ the project owner will prepare and maintain as a public record for the life of the project the As-Graded Grading Plans. CEC staff and its agents shall have access to these filed documents. ~~DWR~~ The project owner will not begin construction of any structure or foundation until notified by the CEC that site earthwork is acceptable to CEC staff.

Verification: The CEC staff may review the As-Graded Grading Plans and accompanying Soils Grading Report and Geologic Grading Report and may conduct a final inspection of site earthwork to verify that site earthwork complies with the accepted final grading plan. If the CEC CPM does not notify the CBO otherwise within 10 days of submittal of the final As-Graded Grading Plan and supplementary reports, the CBO may deem these documents and site earthwork acceptable to CEC staff.

- 9-5. ~~DWR~~ The project owner shall prepare and submit a reclamation plan to the CEC staff to restore the site to its original condition as nearly as practicable.

Verification: At least six months prior to decommissioning of the facility, ~~DWR~~ the project owner shall submit its reclamation plan to the CEC CPM for review and approval.

Structural Engineering

The Structural Engineering section was reviewed by Energy Commission staff and there are no recommended changes other than the administrative changes in the ownership name and reactivating suspended original Conditions 10-1 through 10-6. No new Conditions issued.

- 10-1. ~~DWR~~ The project owner shall design and construct the Bottle Rock Geothermal Power Plant and its related facilities to be in conformance with applicable laws, ordinances, standards, and practices and with the information, criteria, and methods set forth in the following documents:

- DWR Bottle Rock AFC, Section IV.D. (entitled, "Seismic Performance Criteria," revised May 22, 1980), Appendix A (Part III, entitled, "Structural Design and Construction Policy," revised May 22, 1980, and Appendix B (entitled, "A Report on Geysers Power Plants," by Dr. Haresh C. Shah, dated May 1980).
- ~~DWR~~ The project owner will use the Applied Technology Council "Tentative Provisions Applicant's responses (dated November 5, 1979) to Staff Interrogatories.
- ~~DWR~~ The project owner will use the Applied Technology Council "Tentative Provisions Record of telephone conversation, Gaylon Lee (CEC) and Dale Martfeld (DOER), July 21, 1980.
- Applicable Findings and Conclusions regarding Structural Engineering of the Joint Prehearing Conference Statement of the Commission Staff and the Applicant dated August 29, 1980.

In case of discrepancies between various criteria, laws, ordinances, and standards, the most conservative requirement will be used. For the turbine generator building, turbine generator pedestal, cooling tower, and Stretford absorber columns, ~~DWR~~ the project owner will clearly demonstrate through design calculations and drawings that the proposed final plans and specifications are based on and conform with design criteria and methods required by the certificate or that any nonconformance is justified.

Upon submittal by ~~DWR~~ the project owner to the CEC CPM of adequate quality assurance/quality control procedures for review and checking of final design plans and specifications for the proposed structure and equipment, CEC staff may delegate to ~~DWR~~ the project owner responsibility for determining that the proposed final plans and specifications comply with ~~UBC 79~~ CBSC 2001 or other requirements of the certificate.

The Lake County CBO shall review and comment on compliance of proposed plans and specifications with requirements (primarily ~~UBC 76~~ CBSC 2001) of County Ordinance ~~970~~ 2473. The CEC staff or its agent shall review ~~DWR's~~ the project owner's proposed design criteria and methods, preliminary and final plans and specifications, and upon request, may review proposed procurement specifications to determine that the proposed design or design approach conforms with terms and conditions of the certificate (other than County requirement) or, if not, that any nonconformance is justified.

If the ~~DWR's~~ the project owner's proposed design criteria or methods, final plans and specifications, and procurement specifications are not acceptable to the CEC staff, the design documents shall be modified by ~~DWR~~ the project owner until substantial compliance is attained.

~~DWR~~ The project owner shall not begin construction of any structure or foundation for which final plans and specifications have not been accepted by CEC CPM. At least 30 days prior to submittal of any design documents, ~~DWR~~ the project owner will notify the CBO and CPM CPM of the intended submittal date.

~~DWR~~ The project owner will furnish two sets of preliminary plans and specifications to both the CEC CPM and to the Lake County Chief Building Official (CBO) for review and comment concurrently with the Applicant's staff review process.

~~DWR~~ The project owner will simultaneously submit two complete sets of final structural designs, plans, and specifications for each structure and structure foundation to the ~~CAM~~ and CBO at least 75 days prior to the intended date of bid opening.

Verification: ~~DWR's~~ the project owner's design engineer(s) shall sign and/or stamp all proposed final plans and specifications, and shall certify in writing that to his personal knowledge:

- The proposed final plans and specifications are consistent with the applicable referenced criteria and with any other applicable terms and conditions of the certificates and were developed using design criteria and methods accepted by CEC staff, and
- The utility's procurement specifications for components purchased from a vendor, comply with the referenced criteria and with any other applicable terms and conditions of the certificate.

The final plans and specifications will reflect the inclusion of approved criteria, assumptions, and methods used to develop the design, and for the turbine-generator building, cooling tower, and Stretford absorber column, shall include design calculations.

The CBO will within 50 days of submittal of both preliminary and final plans and specifications by ~~DWR~~ the project owner, file concurrently with ~~DWR~~ the project owner and the CEC CPM, a compliance letter containing the county's review comments.

The CAM will, within 70 days of receipt by CEC of ~~DWR's~~ the project owner's proposed final plans and specifications, file a compliance letter to notify DWR if the proposed plans and specifications are acceptable to CEC staff or, if not, what changes are recommended by CEC staff. Should the CPM fail to file a compliance letter within 70 days, ~~DWR~~ the project owner may deem its proposed final plans and specifications acceptable to CEC

Final plans are defined as the plans upon which construction will be based (e.g., used for bid purposes).

10-2. ~~DWR~~ The project owner shall establish and maintain as public records files following documents:

- A summary of concrete strength tests;
- Copies of concrete pour sign-off sheets;
- Bolt torque inspection reports;
- Weld (yield) inspection sheets; and
- As-built drawings for the construction of civil and architectural work (changes approved by the CEC CPM shall be identified on the As-built drawings). CEC staff and its agents shall have access to these filed documents.

Verification: ~~DWR~~ The project owner shall notify the CEC CPM when the documents are available and their location.

- 10-3. ~~DWR~~ The project owner shall keep CEC CPM informed regarding the status of construction.

Verification: ~~DWR~~ The project owner shall submit monthly construction progress reports to the CEC CPM until the start of commercial operation.

- 10-4. ~~DWR~~ The project owner will notify the CEC CPM upon completion of each major structure or component.

Verification: Upon notification by ~~DWR~~ the project owner of completed construction for each major structure or component, CEC staff or its agent may perform final site inspection to determine that the finished work is accurately represented by the as-built plans and specifications and conforms with the approved final plans, specifications, and change orders.

~~DWR's~~ the project owner's responsible civil engineer shall certify in writing to the CEC that the finished work for each major structure or component is accurately depicted in the as-built plans and that it conforms with accepted final plans, specifications, and change orders.

- 10-5. ~~DWR~~ The project owner will file with the CEC CPM or its designated agent substantial design changes to the final plans as required by ~~UBC Section 302~~ CBSC 2001. "Substantial changes" include all changes requiring an alteration in design concept and preparation of new design plans consistent with the AFC conditions of certification. Minor changes shall be reflected in the "as-built" drawings submitted after construction.

Verification: ~~DWR~~ The project owner shall submit two (2) sets of the revised drawings, specifications, and calculations to the CEC CPM or its designated agent for review at least 30 days prior to the intended start of construction on a proposed change order or corrective measure, and will notify the CEC CPM or its designated agent at least 15 days in advance of the intended filing. Within 30 days of receipt by CEC CPM, ~~DWR's~~ the project owner's proposed change order or corrected measure will be deemed approved unless the CEC CPM notifies ~~DWR~~ the project owner otherwise.

- 10-6. Inspection shall be performed in accordance with Chapters 3 and 70 of the Uniform Building Code (1979 edition). The CEC CPM or its designated agent may delegate responsibility for special and continuous inspections to ~~DWR~~ the project owner as provided in ~~Section 305, Chapter 3, of the UBC 1979~~ CBSC 2001. The CEC CPM or its designated agent, may upon reasonable notice, inspect the construction at any time.

~~DWR~~ The project owner will provide, through its Construction Office, a staff of field engineers and inspectors to monitor conformance with the accepted final

plans, specifications, and change orders. These field engineers and inspectors will be present on site at all times to monitor construction activities.

Upon submittal by ~~DWR~~ the project owner to the CEC CPM of adequate quality assurance/quality control procedures for inspection of construction work, CEC staff may delegate to ~~DWR~~ the project owner responsibility for determining that construction work conforms with UBC 79 CBSC 2001 or other requirements of the certificate.

Should the CEC delegate responsibility for inspections to ~~DWR~~ the project owner, ~~DWR~~ the project owner shall certify that the designated inspectors have the authority to:

- Stop construction work which does not conform with approved plans, specifications, and change orders;
- Require changes or remedial work to reestablish conformance; and
- Report substantial nonconformance to the CEC or its designated agent as soon as discovered.

Should ~~DWR~~ the project owner propose substantial corrective measures for any nonconforming construction work, ~~DWR's~~ the project owner's responsible engineer shall sign and stamp the proposed corrective plan, and specifications shall certify that they conform with the applicable criteria. Any nonconformance shall be justified by ~~DWR~~ the project owner.

Any proposed substantial corrective measures shall be reviewed by the CEC or its designated agent to determine that they conform with the applicable criteria or with the design intent.

Upon request by ~~DWR's~~ the project owner's responsible engineer, selected fabricated materials shall be inspected for compliance with contract specification, either in the supplier's shops or on site, by the utility's Engineering Quality Control Inspection Group. The test requirements shall be described in ~~DWR's~~ the project owner's contract specification or referenced standards.

Verification: ~~DWR's~~ the project owner's responsible engineer shall certify in writing to the CEC that the finished work for each major structure or component is accurately depicted in the "as-built" plans and that it conforms with accepted final plans, specifications, and change orders.

If substantial nonconforming work is discovered by any of ~~DWR's~~ the project owner's quality control engineers or inspectors, designated inspector, or by CEC staff or its agent; the discoverer will immediately notify the CEC CPM of the nonconformance.

Solid Waste Management

The Solid Waste Management section was reviewed by Energy Commission staff, and changes to original Conditions 11-1, 11-2, and 11-5 are proposed to update the Conditions to comply with current regulations. Staff proposes deleting Condition 11-3 due to redundancy, adding current Conditions 11-7 and 11-8, and reactivate suspended original Conditions 11-2, 11-4, and 11-6. Administrative changes have been made to original Conditions 11-4 and 11-6.

- ~~11-1. DWR The project owner shall obtain a hazardous waste generator identification number from the Department of Toxic Substances Control prior to generating any hazardous waste during construction and operations ensure that any hazardous waste hauler employed has a certificate of registration from the California Department of Health Services (CDHS), Hazardous Materials Management Section.~~

~~**Verification:** DWR The project owner shall keep a copy of the identification number letter on file at the project site, verifying that hazardous waste haulers have CDHS certificates of registration.~~

- ~~11-2. The only Stretford process waste is sulfur cake with some entrained process chemicals. DWR The project owner shall ensure that the sulfur cake is properly stored in an appropriate container and removed periodically to be sold or disposed at a site approved for such wastes. Any sludge which accumulates in the cooling tower will be removed as needed and hauled by a registered hazardous waste hauler to an approved disposal site.~~

~~**Verification:** DWR The project owner shall submit final design plans and "As-Built" drawings to the Lake County CBO incorporating these design features. In addition, DWR the project owner shall each month submit completed hazardous waste manifests to the Department of Toxic Substances Control under the California Environmental Protection Agency CDHS in compliance with Section 66262.20 66475 of Title 22, CCR CAC.~~

- ~~11-3. DWR shall require that hazardous wastes are taken to a facility permitted by CDHS to accept such wastes.~~

~~**Verification:** DWR shall notify the CEC, CDHS, and Solid Waste Management Board of the selected disposal site. Any notice of change in disposal sites will be submitted as changes occur.~~

- ~~11-4. If a secondary treatment system is used to abate H₂S emissions, the plant may produce additional hazardous wastes. To ensure that these wastes are properly disposed, DWR the project owner shall submit its secondary abatement waste disposal plans, if secondary abatement is required, to the CEC for review.~~

Verification: The plans shall be submitted as soon as ~~DWR~~ the project owner determines secondary abatement is required, but no later than 120 days prior to operation of the secondary abatement system.

- 11-5.** If hazardous wastes, including Stretford sulfur effluent, are stored on site for more than 90 ~~60~~ days, ~~DWR~~ the project owner shall obtain a determination from the Department of Toxic Substances Control ~~CDHS~~ that the requirements of a Hazardous Waste Facility Permit have been satisfied.

Verification: ~~DWR~~ The project owner shall notify the CEC CPM if it files an in-lieu application with the Department of Toxic Substances Control ~~CDHS~~ for the operation of a Hazardous Waste Facility.

- 11-6.** ~~DWR~~ The project owner shall obtain a hazardous waste generator identification number from the Department of Toxic Substances Control prior to generating any hazardous waste during construction and operations ~~ensure that the construction wastes are taken to a waste disposal facility licensed to accept these wastes.~~

Verification: ~~DWR~~ The project shall keep its copy of the identification number on file at the project site and notify the CPM via the relevant Monthly Compliance Report of its receipt ~~notify the CEC and the Solid Waste Management Board of the disposal option selected for the construction waste.~~

- 11-7** Upon becoming aware of any impending waste management-related enforcement action by any local, state, or federal authority, the project owner shall notify the CPM of any such action taken or proposed to be taken against the project itself, or against any waste hauler or disposal facility or treatment operator with which the owner contracts.

Verification: The project owner shall notify the CEC CPM in writing within 10 days of becoming aware of an impending enforcement action. The CPM shall notify the project owner of any changes that will be required in the manner in which project-related wastes are managed.

- 11-8** The project owner shall ensure that the cooling tower sludge is tested pursuant to Title 22, California Code of Regulations, section 66262.10 and report the findings to the CPM.

Verification: The project shall include the results of sludge testing in a report provided to the CEC CPM. If four consecutive tests show that the sludge is non-hazardous, the project owner may apply to the CPM to discontinue testing.

Safety

The Safety section was reviewed by Energy Commission staff, and there are no recommended changes other than the administrative changes in the ownership name, reactivating suspended original Conditions 12-1 through 12-7, and the deletion of Condition 12-10, as it pertained only to suspended operation.

- 12-1. ~~DWR~~ The project owner shall certify that Stretford system pressure vessels and liquid petroleum gas tanks have been designed, constructed and installed in accordance with Title 8, ~~California Administrative Codes (CAC)~~ California Code of Regulations (CCR) and the Tri-Services Manual and anchored to resist a force of an ELF of 0.5w.

Verification: ~~DWR~~ The project owner will prepare and submit to the CEC CPM a certificate of compliance stamped by a registered civil, mechanical or industrial engineer prior to commercial operation.

- 12-2. ~~DWR~~ The project owner shall certify that Stretford system tanks have been designed, constructed and installed in accordance with American Petroleum Institute (API) Standard 650 and the Tri-Services Manual and anchored to resist a force of an ELF of 0.5w.

Verification: ~~DWR~~ The project owner will prepare and submit to the CEC CPM a certificate of compliance stamped by a registered civil, mechanical or industrial engineer prior to commercial operation.

- 12-3. ~~DWR~~ The project owner shall certify that lube oil storage tanks are designed and constructed according to Article 145, Title 8, ~~CAC~~ CCR and anchored to resist a force of an ELF of 0.5w.

Verification: ~~DWR~~ The project owner will prepare and submit a certificate stamped by a registered civil, mechanical or industrial engineer prior to commercial operation.

- 12-4. ~~DWR~~ The project owner shall certify that all storage bins and cylinder anchorages for flammable and hazardous substances are designed and constructed to resist a force of an ELF of 0.5W.

Verification: ~~DWR~~ The project owner will prepare and submit a certificate of compliance stamped by a registered civil, mechanical, or industrial engineer prior to commercial operation.

- 12-5. ~~DWR~~ The project owner shall certify that hydrogen and oxygen systems are installed according to Articles 138 and 139, Title 8, ~~CAC~~ CCR.

Verification: ~~DWR~~ The project owner will prepare and submit a certificate of compliance stamped by a registered civil, mechanical or industrial engineer prior to commercial operation.

- 12-6. ~~DWR~~ The project owner shall certify that ammonia and CO2 gas are stored according to Articles 107 and 76, Title 8, ~~CAG~~ CCR.

Verification: ~~DWR~~ The project owner will prepare and submit a certificate of compliance stamped by a registered civil, mechanical or industrial engineer prior to commercial operation.

- 12-7. ~~DWR~~ The project owner shall certify that design and construction are in reasonable conformance with the applicable fire safety codes and standards listed above.

Verification: ~~DWR~~ The project owner shall submit to the CEC CPM such certification from a registered fire safety engineer or ~~DWR's~~ the project owner's fire insurance company in a compliance report prior to commercial operation.

- 12-8. ~~DWR~~ Project owner shall continue to abide by an approved accident prevention program in accordance with the provisions of Section 3203 et seq. of Title 8, ~~CAG~~ CCR. (These sections include chemical handling & storage and provisions for hazardous materials and airborne contaminant exposure based on Section 5155, Title 8, ~~CAG~~ CCR.)

Verification: ~~DWR~~ Project owner shall notify the CEC CPM of any changes to the approved accident prevention program and provide verification of California Occupational Safety and Health Administration's (Cal/OSHA) approval of said changes.

- 12-9. ~~DWR~~ Project owner shall request California Department of Occupational Safety and Health Administration (Cal/DOSHA) to conduct on-site safety inspections during any ~~the~~ suspension of operations immediately following any complaint.

Verification: During any ~~the~~ suspension, ~~DWR~~ the project owner shall notify the CEC CPM in writing in the event of a violation that could involve DOSHA action, and the necessary corrective action.

- 12-10. During any ~~the~~ suspension period, ~~DWR~~ the project owner shall remove from the plant site, all chemicals, solvents and lubricants, except those essential to maintain the plant, and those only in reasonably required quantities.

Verification: Within 90 days of suspending operations ~~the Commission Order Approving Modified and Reduced Environmental Monitoring~~, ~~DWR~~ the project owner shall submit the following to the CEC CPM:

(1) a list of all hazardous chemicals and the quantities that are to remain on site during any ~~the~~ suspension period, and

(2) the signature of the responsible Plant Manager certifying compliance with this condition.

Within 90 days of receipt of the list and the Plant Manager's verification, the CEC ~~staff~~ CPM will conduct a site visit.

Transmission Line Safety and Nuisance

The Transmission Line Safety section was reviewed by Energy Commission staff. Only administrative changes are proposed to the Transmission Line Safety and Nuisance Conditions 13-1 through 13-7. New Condition 13-8 is proposed to address the subsequent creation of the California Independent System Operator (Cal-ISO).

- 13-1. ~~DWR~~ The project owner shall file a "Notice of Construction or Alteration" form with the Federal Aviation Administration if it is anticipated that construction would result in a transmission line tower or any appurtenance being more than 200 feet in height above the ground level per 14 CFR, Part 77.

Verification: ~~DWR~~ The project owner shall forward a copy of any such filing to the CEC CPM.

- 13-2. ~~DWR~~ The project owner shall construct, operate, and maintain the transmission lines in accordance with Title 14, California Administrative Code, Sections 1254 - 1256, and Public Resources Code, Sections 4292 - 4296.

Verification: Within 30 days after completion of construction, ~~DWR~~ the project owner shall submit a statement from a responsible engineer to the California Department of Forestry and the CEC CPM indicating that the transmission line has been constructed in accordance with applicable requirements. ~~DWR~~ The project owner shall also inspect the transmission line annually to ensure that the line maintains required clearances especially during the fire season. In the event that noncompliance is determined by the CDF, the CDF shall require ~~DWR~~ the project owner to take measures necessary to correct the noncompliance. If ~~DWR's~~ the project owner's corrective measures are unsatisfactory in the opinion of the CDF, the CDF shall inform the CEC CPM and shall recommend a course of action.

- 13-3. ~~DWR~~ The project owner shall ensure that, regardless of location or ownership, all ungrounded metallic fences longer than 150 feet within the right-of-way shall be grounded following the PG&E procedures outlined in the PG&E Drawing 020607, sheets 1 through 5 of 5.

Verification: Within 30 days after completion of transmission line construction, ~~DWR~~ the project owner shall file a statement verifying compliance.

- 13-4. In the event of complaints regarding induced currents from vehicles, portable objects, large metallic roofs, fences, gutters, or other objects, ~~DWR~~ the project owner shall investigate and take all reasonable measures at its own expense to correct the problem for valid complaints, provided that (a) the object is located

outside the right-of-way, or (b) the object is within the right-of-way and existed prior to right-of-way acquisition.

For objects constructed, installed, or otherwise placed within the right-of-way after right-of-way acquisition, ~~DWR~~ the project owner shall notify the owner of the object that it should be grounded. In this case, grounding is the responsibility of the property owner. ~~DWR~~ The project owner shall advise the property owner of this responsibility in writing prior to signing the right-of-way agreement.

Verification: ~~DWR~~ The project owner shall maintain a record of activities related to this paragraph. These records shall be made available to authorized staff upon request.

- 13-5. ~~DWR~~ The project owner shall ensure that the design and construction of the transmission line satisfies or exceeds both the requirements of CPUC General Order 95 and the terms and conditions of CEC certification. ~~DWR~~ The project owner shall receive CEC approval for a waiver of any General Order 95 requirements. ~~DWR~~ The project owner shall also receive CEC approval for any of the following significant changes in transmission line design:

- Any change in conductor size from 1,113 kcmil.
- Any tower configuration other than as proposed in the AFC.
- Change to the number of circuits.
- Change to the voltage level of line.
- Changes in normal or emergency conductor capacity greater than 15 percent.
- Change in termination point.
- Change in route length.
- Changes to the route right-of-way width.

Verification: Within 30 days following completion of the transmission line, ~~DWR~~ the project owner shall submit to the CEC CPM a statement signed by a California registered electrical engineer which verifies compliance with the requirements of CPUC General Order 95 and with the terms and conditions of CEC certification.

- 13-6. On-site worker safety inspections may be conducted by the California Division of Occupational Safety and Health (CAL/DOSH) during construction and operation of the transmission line or when an employee complaint has been received. ~~DWR~~ The project owner shall notify the CEC CPM in writing in the event of a violation and shall indicate if such violation may delay the transmission line construction schedule.

Verification: ~~DWR~~ The project owner shall maintain records of CAL/Dosh inspections and shall make them available to authorized staff upon request. CAL/DOSH will notify the CEC CPM of alleged violation(s) and recommended course of action in writing within seven days of such determination.

- 13-7. ~~DWR~~ The project owner shall make every reasonable effort to locate and correct at ~~DWR's~~ the project owner's expense, on a case-by-case basis, all causes of radio interference and television interference attributed to the transmission line facilities, including, if necessary, the modification of receivers and the furnishing and installation of antennas. In addition, ~~DWR~~ the project owner shall take reasonable care to prevent the conductors from being scratched or abraded.

Verification: ~~DWR~~ The project owner shall maintain records of complaints and corrective action and shall make these records available to authorized staff.

- 13-8 The project owner shall provide the following Notice to the Cal-ISO prior to synchronizing the facility with the California transmission system:

1. At least one week prior to synchronization the facility with the grid for testing, provide the Cal-ISO a letter stating the proposed date of synchronization; and
2. At least one business day prior to synchronizing the facility with the grid for testing, provide telephone notification to the ISO Outage Coordination Department.

Verification: The project owner shall provide copies of the Cal-ISO letter to the CEC CPM when it is sent to the Cal-ISO one week prior to initial synchronization with the grid. The project owner shall contact the Cal-ISO Outage Coordination Department, Monday through Friday, between the hours of 0700 and 1530 at (916) 351-2300 at least one business day prior to synchronizing the facility with the grid for testing. A report of conversation with the Cal-ISO shall be provided electronically to the CEC CPM one day before synchronizing the facility with the California transmission system for the first time.

Noise

The Noise section was reviewed by Energy Commission staff and there are no recommended changes other than the administrative changes in the ownership name and clarification of the responsible county department. Reactivate suspended original Conditions 16-2 and 16-3. No changes to modified Condition 16-1.

- 16-1. ~~DWR~~ Project owner shall comply with Lake County's noise ordinance, which is 55 dBA Ld and 45 dBA Ln at any point beyond the property line of the source. In the event the Lake County ~~Air Quality Management District (LCAQMD)~~ or ~~DWR~~ the project owner receives public complaints of any noise, ~~DWR~~ project owner and ~~the LCAQMD~~ Lake County (if requested by the complainant) agree to

promptly conduct an investigation to determine the extent of the problem. DWR Project owner shall take reasonable measures to resolve the complaints.

Protocol: Within 10 days of a request by ~~the LCAQMD Lake County~~ or the CEC CPM, DWR project owner shall conduct noise surveys at the sensitive receptors registering complaints and at the facility property line nearest the complaining receptors. Surveys shall be conducted, when possible, under circumstances similar to those when the complaints were perceived. The survey should be reported in terms of L_{eq} and L_z at levels $x=10, 50, \text{ and } 90$.

Verification: DWR Project owner shall promptly forward to ~~the LCAQMD Lake County~~ the survey results, the mitigation measures applied to resolve the problem and the results of these efforts. LCAQMD Lake County shall advise the CEC CPM of any continuing noncompliance conditions.

- 16-2. Within 90 days after the plant reaches its rated power generation capacity and construction is complete, ~~DWR the project owner~~ shall conduct a noise survey at 500 feet from the generating station or at a point acceptable to DWR, CEC CPM, and ~~the LCAQMD Lake County~~. The survey will cover a 24 hour period with results reported in terms of L_x ($x = 10, 50, \text{ and } 90$), L_{eqZ} and L_{dn} levels.

~~DWR The project owner~~ shall prepare a report of the survey that will be used to determine the plant's conformance with county standards. In the event that county standards are being exceeded, the report shall also contain a mitigation plan and a schedule to correct the noncompliance. No additional noise surveys of off-site operational noise are required unless the public registers complaints or the noise from the project is suspected of increasing due to a change in the operation of the facility.

Verification: Within 30 days of the noise survey ~~DWR the project owner~~ shall submit its report to ~~the LCAQMD Lake County~~.

- 16-3. Within 90 days after the start of commercial operation, ~~DWR the project owner~~ shall prepare a noise survey report for the noise hazardous areas in the facility. The survey shall be conducted by a qualified person in accordance with the provisions of Title 8, ~~CAG CCR~~, Article 105. The survey results will be used to determine the magnitude of employee noise exposure. If employee complaints of excessive noise arise during the life of the project, CAL/DOSH, Department of Industrial Relations shall make a compliance determination.

Verification: ~~DWR The project owner~~ shall notify CAL/DOSH and the CEC CPM of the availability of the report.